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The Montezuma Mining District, Colorado

Revival of a Lead-Silver-Zinc Camp on an Extension of the Georgetown and Silver Plume Mineral Belt

BY ETIENNE A. RITTER*

The important mineral belt of the Georgetown and Silver Plume districts, Colorado, does not stop at the top of the Front range; the belt can easily be traced through Argentine to Montezuma and beyond, toward Breckenridge and Kokomo. The district of Montezuma has shown a great deal of activity during the past summer and a number of old properties are being reopened with marked success. The district was discovered in the early sixties. It received the first patent issued to a lode-mining claim in Colorado, and others between Nos. 1 and 500.

In 1864 some adventurous prospectors crossed the range by way of Argentine pass and the discovery of rich silver ores a few feet below the surface gave a great impetus to mining in the new district. The town of Chihuahua soon had 3000 inhabitants. The ore was packed on burros to the pioneer smeltery of the State, at Black Hawk. Since the packing and treatment charges were at least $60 per ton, only very rich ore could be mined at a profit. A few years later, the discovery of Leadville caused an exodus of most of the prospectors, who rushed to the new camp. The decrease in population came at a time when the rich surface silver ores were about exhausted and when the mines had reached a zone of zinc sulphides mixed with the lead-silver ores, which could not be treated by the metallurgical methods in use, and which handicapped seriously the development of the district. Later on, the fall of the price of silver in 1893 was another serious blow to the mining industry in the Montezuma district. Nevertheless, some of the mines have been kept at work, one starting while the other was closing down, so that the district has produced and shipped a certain amount of ore every year. But it was remote from the main lines of travel, and it was long before it attracted the attention it justly deserves.

The increase in the price of silver, the

THE TOWN OF MONTEZUMA, COLORADO

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advanced methods in the separation of lead from zinc in the milling-grade ores which contain both metals, and a good market for the zinc concentrates, have changed the situation and the district is now enjoying a healthy revival.

Topography and Geology

The district is very mountainous; the town of Montezuma is picturesquely nestled in a short valley, at the foot of Collier mountain and at an altitude of 10,200 ft. The surrounding peaks reach above 13,000 ft.; they are well timbered half way up their slopes. Their summits are snow-clad all the year, except during the late summer months. On account of the topography, all the mining operations are conducted through adits and in most cases by adits driven on the veins.

The mountains belong to the backbone of the Front range; they are of the crystalline schists and the gneisses of the Archean, cut by granite masses and by long dikes of granulite, of pegmatite and of granite porphyry. The geology of the mineral belt is very similar to that of its extension in the direction of Georgetown and Silver Plume, and the veins are also fissure veins, closely associated with the eruptive dikes.

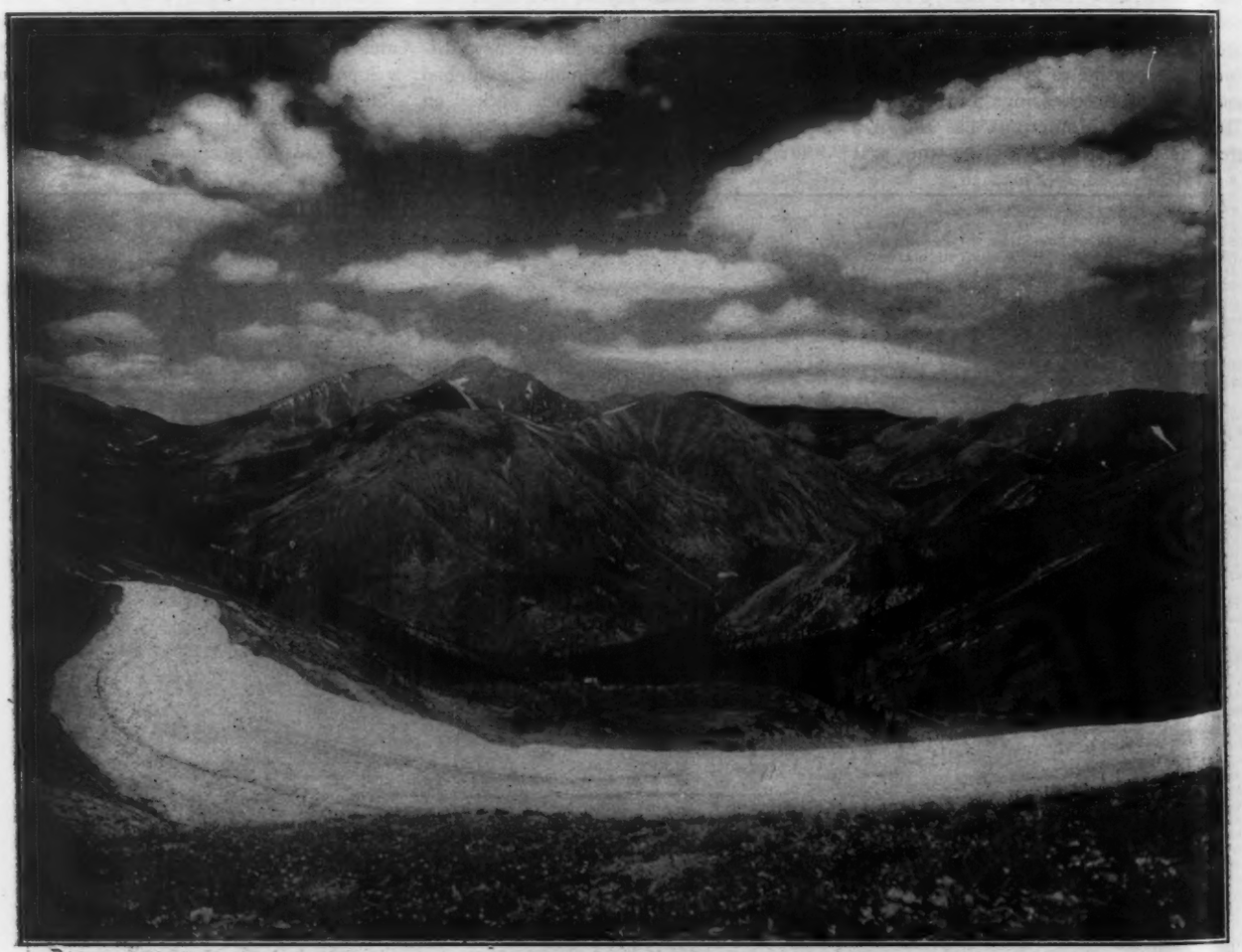
Vein Systems

The accompanying map shows the general trend of the veins, some of which are from one mile to several miles long. On these main lodes, several mines have been opened, usually about a half mile apart. The map also shows the continuation without a break of the mineral belt, which has produced so heavily in the mines about Georgetown and Silver Plume, into the Montezuma district. The veins form two groups, which cut each other nearly at right angles. A group is made of northeast and southwest veins; these are the main lodes of the camp; they are longer, better defined and usually richer than the others. When ore is found in the veins of the other group, with a northwest-southeast direction, it is often at the junction with some vein of the northeast-southwest group. The Bullion mine shows the best example of deposits of this kind. It mines orebodies along a vein of the northwest-southeast group, called the Yellow Jacket (Nos. 57, 58 and 59 of the map), which are crossed by a series of veins of the first group, the Bullion (No. 77), the Aorta (No. 78) and the Waukegan (No. 79).

It is also worth noticing that most of the important northwest-southeast veins are limited to a relatively small area in the center of the district.

The veins of the first group have a direction more nearly north and south in the West Argentine district, on the slope of Gray's Peak, for instance, than in the central part of the district, and this gradual change of direction continues farther south, where some veins like the Centennial (No. 36) and the General Teller (No. 37), or the Wild Irishman (No. 34) and the Silver Prince (No. 35), have a trend much more east and west.

The width of the veins varies greatly, from one to 10 and even 15 ft.; but the variations along the same vein are not marked. The veins are fissure veins, with usually well defined walls. Since they have not been opened up at a depth greater than a few hundred feet below the surface, they still show signs of superficial alteration, and most of them present a clay selvage, from a fraction



RUBY MOUNTAIN, GRAY'S PEAK AND ARGENTINE PASS, NEAR MONTEZUMA, COLO.

of an inch to three or four inches in thickness along the footwall. The clay selvage along the hanging wall is usually much narrower and may be missing entirely.

As a rule, not all of the vein is ore-bearing; it contains in most cases a streak of smelting grade which may narrow down to a fraction of an inch or open to several feet. When the vein becomes poorer, the metals are not scattered so as to give a milling-grade ore occupying the full width of the vein; on the contrary, the ore concentrates in a small streak of smelting grade. The streak may be followed for several hundred feet and keep its narrow width; in other cases it may widen to several feet of smelting grade. The Silver Wave mine had a streak of smelting-grade ore 3 ft. wide for a distance of 400 ft., and a hight of almost 300 feet.

THREE ADITS ON THE SILVER KING VEIN, SILVER PRINCESS MINING COMPANY, MONTEZUMA, COLO.

Mineralization

Many of the best mines are almost exclusively producers of silver; native silver, hornsilver and ruby silver have been the chief silver minerals of the district. Ruby silver, especially, is a characteristic mineral of the silver ores of both the Georgetown and the Montezuma districts.

Lead is often associated with the silver and in some of the best mines the vein contains only a streak of this metal in high-grade ore with no milling grade beside it. That streak of high-grade ore may not be in the center, but may follow either the footwall or the hanging wall. There are seldom two separate streaks, one along each wall. While it may be very narrow, the streak is in many cases continuous without a break between two different oreshoots; the oreshoots in which it opens may vary from 100 to 1000 ft. in length. The old Bell mine (Nos. 30, 31 and 32) had an oreshoot 1000 ft. long.

Some mines, such as the Sarsfield (No. 56) and the Quail (No. 99), are characterized by a streak of high-grade ore, with little milling grade associated with it, while others have large bodies of milling-grade ore, like the Silver King (No. 65), which now shows from 6 to 10 ft. of milling ore in the breast of its stopes. The Silver King also has some very high-grade ore, but not in the stope of milling ore, and the streak of high-grade ore has little milling ore associated with it.

In all the mines, the lead and the zinc, while not absolutely free from each other, form usually separate streaks, a zinc streak very poor in lead, and a lead streak with but little zinc. These two different streaks are found alongside one another in the Sarsfield (No. 56) and in the Silver Wave (No. 15) mines. In the Chautauqua vein (No. 47), the lead streak of smelting ore is 3 in. thick along the hanging wall, while another streak of smelting zinc ore of the same thickness follows the footwall. The streaks are separated by 3 to 5 ft. of milling ore, where the zinc and the lead are mixed together.

Position of Orebodies

The veins are quartz veins, with a fairly large amount of pink feldspar. The outcrops of the veins are striking and they show a very large amount of iron; in fact they are almost always characterized by a good iron capping, which is remarkably strong, when it is considered that the veins contain relatively a very small amount of pyrites. There is a good deal of crustification in the upper part of the veins. Many empty cavities are lined with quartz, while the cubes of galena, often with ½-in. faces, are intimately mixed with a matrix composed chiefly of pink feldspar with some talc and quartz. Everything seems to indicate that the veins were originally very silicious dikes, composed of quartz and

feldspar, almost of the composition of an alaskite, and that they have been thoroughly transformed by the action of the mineralizing waters. So far, the district has exposed only the upper part of the veins, where the secondary action of the downward circulation of the surface waters has given rise to the most conspicuous features.

The main veins with the northeast-southwest direction almost all dip to the northwest at very variable angles, ranging from almost vertical, like the Sarsfield, the Silver Wave or the Bullion veins, to a dip of 70 to 75 deg. like the Bell (No. 32), the Wild Irishman (No. 34) and the Radical (No. 51) veins, to the Chautauqua vein (No. 47), and the Cashier (No. 84), which have a dip of 45 degrees.

While the camp has not been mined extensively as yet, it is already possible to get a general idea of the trend of the oreshoots. The shoots are almost vertical in the Sarsfield and in the Silver Wave and they pitch to the southwest in the Silver King; but the greatest number of the oreshoots pitch to the northeast as in the Peruvian, the Bell, the Bullion and several other mines.

With the energetic work of development now going on, and the probable advent of the railroad, the building of a concentrating mill and the distribution of cheap electric power, many of the old stopes will be reopened. New bodies will be developed, and it will then be possible to accumulate a much larger amount of accurate information, for the study of the problem of the origin of the Montezuma ore deposits, and of the successive alterations which have brought them to their present condition.

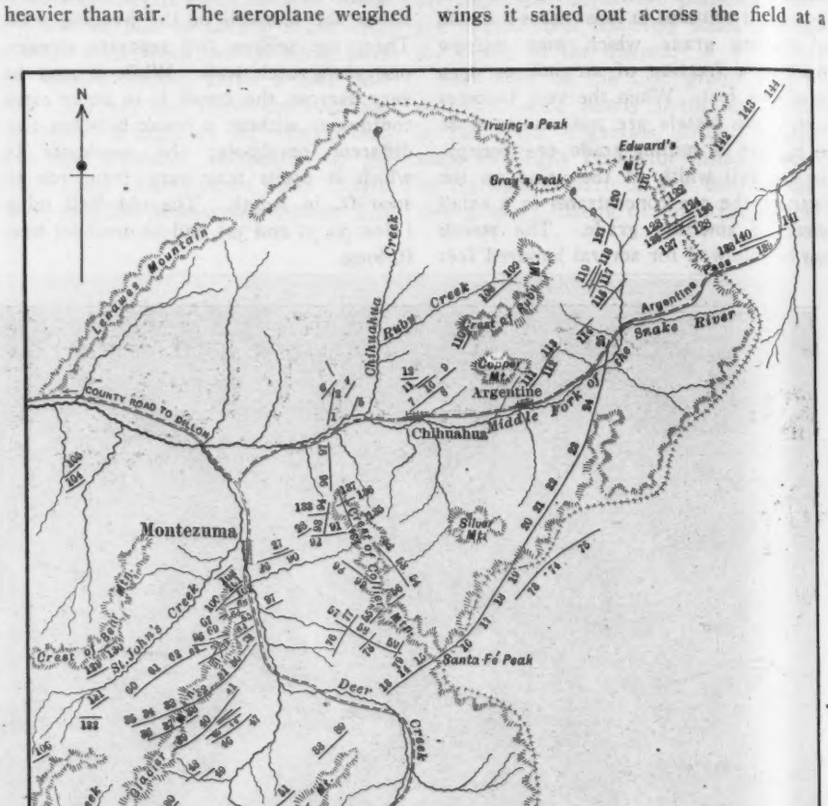
Black ends which are familiar to all by-product coke oven operators are due to insufficient heat caused by cold air blowing in the oven ends, entrance of air through imperfectly sealed doors, low temperature in the first flues in the side walls where vertical flues are used, insufficient recessing between the side walls of the oven, or chilling resulting from the solid door. These disadvantages can be overcome by the use of doors provided with an internal vertical, zigzag flue, built of fire-clay bricks, with an external gas admission aperture at the base and an escape port on the upper part, both of which are provided with sliding shutters. This arrangement allows the burning of gas in the flue and thus heating that part of the door that comes in contact with the charge of coal in the oven. All-gases uninfluenced by the heated side-wall flues can thus be driven off. There is no internal communication with the oven.

Any company employing many foreign miners should have one shift boss on each shift who can speak their language.

An Advance in Aeronautics

Henry Farman, at Paris, Jan. 13, won the Deutsch-Archdeacon prize of $10,000, making a circular kilometer in an airship heavier than air. The aeroplane weighed 300 lb. A framework of ash and piano wires supports two horizontal parallel planes of light sail cloth 30 ft. long. A 50-h.-p. motor is placed just behind and above the level of the lower plane of the forward set of sails. In front protrudes a horizontal rudder which, raised or lowered, changes the elevation at which the machine glides. The motor has eight cylinders and weighs 176 lb.

With the preliminary run of 100 yd. over the ground the aeroplane had risen to a hight of 12 or 15 ft. before it reached the starting pole. Then with outstretched wings it sailed out across the field at a hight of 25 to 30 ft. It was going at the rate of 24 miles an hour. As it approached the outer mark it described a graceful curve, descending slightly the while. The turn was completed successfully, the wings righted the machine, and the aeroplane came sailing home on an even keel.



MAP OF MONTEZUMA MINING DISTRICT, SHOWING LOCATION OF MINES

(1) Grand Union, (2) St. Lawrence, (3) Maid of Orleans (Madof Orleanse), (4) Chihuahua, (5) Rosalie, (6) Pella, (7) Bertha, (8) Fifth of July, (9) Grey Eagle, (10) Little Chief, (11) Chicago, (12) Buda, (13) Climax, (14) Lucky Baldwin, (15) Silver Wave, (16) Silver Chord, (17) Mary Ann, (18) Great Republic, (19) Challenger, (20) Sunrise, (21) Delaware Extension, (22) Delaware, (23) Pennsylvania, (24) Pennsylvania Extension, (25) Lone Jack, (26) Waterloo, (27) Old Settler, (28) Surprise, (29) Silver Wing, (30) Eureka, (31) California, (32) Sunburst, (34) Wild Irishman, (35) Silver Prince, (36) Centennial, (37) General Teller, (38) Marxon, (39) Condor, (40) Woodchuck, (41) Walker, (42) Little Emma, (43) Eclipse, (44) Itaska, (45) Scotia, (46) Defiance, (47) Chautauqua, (48) Sampson, (49) Rustler, (50) Radical (51) Radical, Jr., (52) Carrol, (53) Braganza Extension, (54) Braganza, (55) Atlantic, (56) Sarsfield (57) Yellow Jacket Extension West, (58) Yellow Jacket, (59) Yellow Jacket Extension, (60) Arctic, (61) New York, (62) Potosi, (63) Tunnel Lode No. 7, (64) Old Timer, (65) Silver King, (66) Moscow, (67) Denver, (68) Celtic, (69) St Elmo, (70) Tiger, (71) Windsor, (72) St. Coud, (73) Best, (74) Baltic, (75) Revenue, (76) Bullion Extension, (77) Bullion, (78) Aorta, (79) Waukegan, (80) Erie, (81) Champion, (82) Bertha, (83) Cyvert, (84) Cashier, (85) Venus, (86) Silver Medal, (87) Charles Comstock, (88) Red Jacket, (89) Red Jacket Extension, (90) Thunderbolt, (91) Arapahoe, (92) Botts, (93) Tip Top, (94) Monitor, (95) Tunnel Lode No. 5, (97) Ballarat, (98) Rose, (99) Quail, (100) Harrison, (101) Yorkshire, (102) Adder, (103) Fourth of July, (104) Don Pedro, (105) Hunkidori, (106) Erickson, (107) Meteor, (108) Rudolph, (109) Howard, (110) Sylvia, (111) Gold Bug, (112) Rotschild, (113) Rotschild No. 2, (114) Peruvian, (115) National Treasure, (116) Silver Ledge, (117) Minerva, (118) Whale, (119) Silver Falls, (120) Baalbec, (121) Tenth Legion, (122) Rip van Winkle, (123) Little Chief, (124) Little Chief Extension, (125) Lone Star, (126) Lone Star Extension, (127) Queen of the West, (128) Queen of the West Extension, (129) M. & N., (130) Liberty, (131) Marion E., (132) Yankee Doodle, (133) Cross, (134) Florence-Belle, (135) Lelia, (136) Susy, (137) Maggie T., (138) Golden Rule, (139) Simon, (140) Bullion King, (141) Flossie, (142) Santiago No. 9, (143) Santiago, (144) Centennial.

Richmond-Eureka Mining Company

The following is the report, slightly condensed, of A. F. Holden, managing director of this company, to the president, Albert Fries, under date of Jan. 1, 1908.

VEIN, 2 FEET OF SMELTING ORE, SILVER WAVE MINE, MONTEZUMA DISTRICT

Eureka Consolidated Mine

The work of the past year has largely added to the known low-grade ore supply. It is not that we have discovered new bodies, but we have developed the known orebodies, which in nearly every case have proved to be larger than our original estimate. I have called your attention before to the fact that above the 900-ft. level there is very little new ground in the Eureka Consolidated mine to prospect, and our chance of finding a high-grade orebody in the upper levels of this mine is rather remote.

The Locan shaft has been put in first-class condition to the 900-ft level and that level redriven to the vein, which it struck at approximately the 1200-ft. level of the old Econ incline. This level was in the active process of being developed when the orders were received to curtail expenses, so the Locan shaft was closed down. In the work that we did in this level two very promising low-grade orebodies were opened. It will be our hope and expectation that in further working of these, high-grade ore might be developed, as in the work that was done small bunches of better grade ore were developed, though no even considerable pocket was opened.

Richmond Mine

The principal work in this property is being confined to the Lizette tunnel and the 600-ft. level. You will recall that the bonanza orebodies of the Richmond were not found below the 600-ft., though between the 400 and 600 the largest and richest orebodies in this property were opened.

The work that we have done has been confined principally to opening up two of the low-grade oreshoots, both of which have proved larger than we thought they would. It will be, in our opinion, by following these low-grade ore channels that we will eventually pick up the high-grade orebodies. There is scarcely a doubt that the Richmond orebodies did not peter out, but the trend of them was lost by the old company. I have seen this same occurrence many times in other properties. I have also seen careful work pick up the orebodies again and the mines be reopened with large results. I think this will be the history of the Richmond, as unlike the Econ, the upper levels have not been sufficiently prospected. The limestone is very large and the possibilities of ore are very great. It will mean merely careful and persistent work. I have the greatest possible confidence in the Richmond property, and believe that sooner or later a very fine mine will be developed there.

Mechanical Equipment

The machinery and its installation at the Locan shaft is especially to be commended. Whenever the operations are to be resumed the machinery will be found adequate and efficient for working to a great depth.

The Eureka & Palisade Railroad continues giving us very inefficient service. Its equipment is not adequate and its road-bed is scarcely in condition to haul the tonnage. The result is that the operation has been extremely variable. Lately it has handled about 200 tons a day, but it is very uncertain that it can maintain this tonnage under winter conditions.

Bolivian Tin in Europe

The Bolivian tin trade with Europe for the full year is reported as follows by Messrs. H. A. Watson & Co., of Liverpool, in long tons; the figures including tin content of concentrates:

	1906.	1907.	Changes.	
Stocks, Jan. 1	573	446	D.	127
Arrivals	13,862	12,262	D.	1,600
Total	14,435	12,708	D.	1,727
Consumption	13,989	12,189	D.	1,800
Stocks, Dec. 31	446	519	I.	73

Arrivals in 1907 included 1143 tons of bars and 18,532 tons of concentrates, carrying 11,119 tons of metal.

Vanadium Deposit at Magdalena, New Mexico

By A. Lawrence Heister*

Near the town of Magdalena, Dr. J. H. Young recently found a deposit of pink and red crystals which proved to contain vanadium in paying quantities. Four shafts have been sunk in the ore-body, which besides vanadium contains galena, silver and copper. At present two companies are working groups of claims, and about 150 locations have been made within the last three months.

A test on ore from the Silver Line claim showed 7.8 per cent. vanadium. This claim is on a well defined contact vein which has been opened in various places for more than a mile and a half. The vein matter seems to be a mixture of rhyolite, quartz, barite and baryto-calcite. The entire vein matter is charged with vanadinite crystals. The Silver Line shaft is down only 22 ft. and shows 6 ft. of ore.

Treatment Problem of the Republic (Wash.) Gold Ores

By Fritz Cirkel†

The treatment of the Republic gold ores has offered so many difficulties since their discovery in 1893 that practically all the quartz mines were forced to close down several years ago. Upward of a million dollars has been spent on experiments, processes and mills, but the solution of the difficulty seems to be as far off as ever.

A casual inspection of the Republic ore would give the impression that it is of low grade. The quartz is of a peculiar milk-white appearance; most of it is devoid of sulphides or any other minerals generally associated with gold. In most of the ore, even in panning, we hardly detect any visible gold except by microscopical examination. Nevertheless this "hungry-looking quartz" contains gold and silver sometimes up to several hundred dollars per ton.

Pelatin-Clerici Process

When the Republic Mining Company, owner of the Republic mine, at one time famous for the richness of its ore, was confronted with the problem of gold extraction, experiments showed at once that the cyanide method generally in vogue would not answer the purpose. The cyanide solution did not thoroughly percolate through the pulp ground to 40-mesh, and a large percentage of the gold was left undissolved. The experiments showed, however, that if the ore was pulverized very finely, the gold could be dissolved. The Pelatin-Clerici process was adopted, and it was decided to build a mill for a daily capacity of 30 tons. The main feature of this method is to dissolve the precious metals and precipitate them from the solution in one operation. The apparatus is a tank provided with an amalgamated copper bottom, a metallic stirrer and electrical connection. Electric current is passed through the pulp while it is continuously stirred, solution and precipitation proceeding at the same time. Coarse gold goes down by gravity and amalgamates at the bottom; all metals are saved in the form of amalgam.

A mill for this process was put in operation in May, 1898. It treated only 30 tons per day, but its achievements during the short period of its existence were better by far than those of any of its more ambitious and costly successors. However, this was due not to the excellent working of the process, but to the great richness of the ore treated. The percentage of saving was from 55 to 80, and the cost of treatment per ton about $8. It was found that the electrical process did not operate as anticipated. The process seemed to work most satisfactorily after a clean-up and after the electrodes in the tanks had been freed of their coating. In some cases saving of only 50 per cent. of the gold was made, and the enormous loss, together with the high cost of treatment, made the process an unprofitable one.

Experiments at the Mountain Lion

The problem was again taken up, not only by the Republic people, but also by the Mountain Lion Gold Mining Company. The Mountain Lion ore showed about the same characteristics as the Republic ore, with the exception that some of the gold was coarse. Experiments with the Mountain Lion ore were made on a large scale, under my direction, and the conclusion was reached that it could best be treated by the stamp-mill amalgamation process, with subsequent pulverizing and cyaniding. James A. Pack, of Boise City, Idaho, after a careful test, came to the conclusion that the ore could be treated by crushing with stamps to 40-mesh, the pulp passing over amalgamating plates and the tailings being conveyed to settling ponds where the surplus water would be removed and the tailings then conveyed to suitable tanks and treated by the cyanide method. Mr. Pack obtained with 80-mesh pulp and a percolation lasting 108 hours an extraction of 93.8 per cent. of the gold. But by continuing the treatment up to 150 hours he found that 96 to 98 per cent. could be extracted. John Longmaid, of Bourne, after roasting the ore and cyaniding for 46 hours obtained a 94.2 per cent. extraction.

It would unnecessarily prolong this paper to enumerate all the experiments made with this ore before a definite plan was decided upon. It is sufficient to say that the Gold and Silver Extraction Company of America undertook the responsibility for the treatment of the Mountain Lion ore at a royalty of 10c. per ton, at the same time guaranteeing an extraction of at least 85 per cent. of gold and of at least 60 per cent. of silver. The mill was constructed in 1899, and although the process employed did not give the satisfaction anticipated, I believe it is of interest to give here a brief description of it, for the reason that it is the only mill of its kind ever erected in the Pacific States.

Process of Gold and Silver Extraction Company

The ore was raised from the mine through a vertical shaft in a self-dumping skip and dropped upon a grizzly, the coarser passing through a 9x15-in. Blake rock crusher, and thence with the finer material into a 200-ton bin. From that it was delivered into side-dumping cars, and passing down an automatic tramway, dumped into bins at the top and at the east end of the mill. It was mechanically handled from the moment it left the mine until the tailings were sluiced out of the mill.

From the bins the ore went to four stamp batteries, each having five 1200-lb. stamps, dropping 7 in. and crushing the ore to 30 mesh. From the stamps the pulp passed over amalgamated copper plates, thence to four Huntington mills, in which it was reground to 80 or 100 mesh. It was then raised by bucket elevators to the settling tanks, in which it was freed from the major part of the water. The pulp from the settlers was transferred to agitating tanks, in which it received an eight-hour treatment with an excess of cyanide solution, and then was allowed to settle. All the clear solution was decanted off, and a second solution of cyanide, weaker than the first, was added to the pulp in the agitators for a second treatment. After the latter the charge was sluiced off to big percolating or filter tanks, and there allowed to settle. The clear liquor was then drawn off, and the remaining solution was drawn through the pulp by means of a vacuum pump. This completed the percolation. The charge was then washed, and the tailings sluiced out. The solution coming from the agitators and the filtering tanks, passed through zinc boxes. The entire process required 36 to 48 hours.

There were four storage, six filtering, five agitating, two vacuum and two sump tanks, all made of steel. The storage tanks were 16 ft. in diameter and 10 ft. deep, with a capacity of 65 tons each. The settling tanks were funnel-shaped, 12 ft. in diameter at the top, and 12 ft. deep. The agitating tanks, each capable of holding 30 tons of ore and solution, were 10 ft. deep and 11½ ft. in diameter. They were provided with blades of the propeller type, which made 16 r.p.m. The filter tanks were 24 ft. in diameter and 4½ ft. deep, with capacity of 60 tons each. The zinc

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boxes each had nine compartments 27 in. long, 16 in. wide and 20 in. deep.

Disappointing Results

The mill was started on March 15, 1900, and for the first two clean-ups gave by amalgamation and cyanide a total saving, by actual bullion recovery, of only 64 per cent. gold and 35 per cent. silver. The causes for the low extraction were apparently bad agitation and coarseness of the pulp treated, and after repeated experiments it was found that owing to the coarseness of the pulp, agitation of the whole was not practicable. So the fine and coarse, after leaving the plates, were separated, the fines agitated and the coarse treated by percolation. For several months the mill was run on this improved plan, modified by a number of other changes, and below is a summary of the results obtained:

	Treated Tons	Assay Value.		Gross Value.	Assay Value.		Slag.	Total.	Per Cent. Saving.
		Gold.	Silver.		Amalg'tion	Cyanide.			
May.....	2135	$12.39	$1.87	$30,445.10	$7,042.40	$5,231.75	$269.66	$12,543.81	41.2
June.....	2225	10.20	1.73	26,544.25	4,195.71	5,901.55	269.66	10,366.92	39.0
July.....	2201	8.50	1.38	21,755.76	4,449.64	8,101.84	359.40	12,910.88	59.3
August..	1806	7.49	1.47	16,181.76	3,773.94	5,988.25	256.20	10,018.39	61.9
Sept.....	1711	8.11	1.44	16,340.15	3,314.57	4,275.67	145.42	145.42	47.3
October..	1880	7.95	1.54	17,860.05	3,918.74	6,265.30	239.57	239.57	58.3

The milling cost was $3.73 per ton and the average saving during the six months' run was only 54.9 per cent. of gold and 26.9 per cent. of silver. In consequence of this disappointing result, the mill was closed, Nov. 1, 1900. Further metallurgical tests were made with the ore, and though the results showed some encouragement, it was not deemed advisable to incur any further expense for mill modification, especially in view of the fact that at that time it was regarded as certain that a railroad would soon be constructed to the town of Republic, giving an opportunity of selling the ore to smelters.

The Mountain Lion mill was erected at an expenditure of about $60,000, and although it may not yet be considered a failure, still the fact remains that it is not always a wise policy to launch an enterprise of such a nature on too large a scale. In 1900 another company erected a custom mill in the town of Republic, and, like the Mountain Lion it was a failure as far as the extraction of the metals was concerned. No data were obtainable regarding the operation of this mill, but it appears from information received that the results obtained were similar to those in the Mountain Lion mill.

The Republic Mill

While the Mountain Lion mill was in course of construction, the Republic Consolidated Gold Mining Company was trying to improve the method of treatment in its mill. The services of Daniel C. Jackling were obtained, and his experiments led to the construction of a new 200-ton mill at a cost of something like $300,000. The plant began receiving ore in October, 1900, and continued to run, at part capacity only, until July, 1901, when it had to be shut down on account of an insufficient ore supply. Developments in the Republic mine had not advanced rapidly enough to keep pace with the production, and it was no longer possible for it to furnish enough ore to supply the mill with more than a small fraction of the tonnage required for an economical running capacity.

Another serious factor was a controversy between the milling company and the various mining companies as to what was a proper treatment rate. This consideration had resolved itself into practically a dead-lock, from which neither side saw its way clear to recede. However, the mill did receive lots of ore from most of the properties of the district, varying in quantity from a few tons to several hundred tons from each mine, the total of such shipments being ample in quantity and variety, when combined with ores from the Republic mine, to run the plant at somewhat less than half capacity for the entire period of the operation.

As to the results obtained with this new mill no actual statements have been published; we hear from its designer that the methods were well suited to the treatment of most of the silicious ores of the district and that the average percentage of recovery was as high as ordinarily maintained in hydrometallurgical plants of a like grade of ore. From other sources it is learned that the treatment charges were so high as to exclude all possibility for the other mines of having their ore treated by this process. With a few interruptions most of the mines have been idle ever since; those which worked were obliged to send their ores to the smelters. This was done as soon as the Kettle Falls railroad entered Republic and in 1903-1905 a great number of shipments were made from various mines (from the Mountain Lion alone over 16,000 tons) to the Hall and Granby smelters in British Columbia. But it was soon found that the market for Republic ore was not so large as at first supposed.

In October, 1903, the Mountain Lion company resumed the tests with the ore, this time with the Hendryx process. During the winter of 1903-1904 the mill was altered to suit this process and a 50-ton agitator added, but the results did not come up to expectations, and the mine had to fall back again on the smelters for the treatment of its ore.

Such is the history of the treatment of the Republic ore. A large amount of money and energy has been spent on research, experiments and mill construction, and the Republic camp is today, as far as its quartz mines are concerned, no further ahead than it was 10 years ago.

Anthracite Coal Shipments in 1907

The shipments of anthracite coal from the Pennsylvania collieries in 1907 reached a total of 67,109,393 long tons, the largest ever reported. This was 11,410,798 tons more than in 1906, and 5,699,192 tons more than in 1905.

The shipments for 10 years past have been as follows:

1898.....	41,899,751	1903.....	59,362,861
1899.....	47,665,204	1904.....	57,492,522
1900.....	45,107,484	1905.....	61,410,201
1901.....	53,588,601	1906.....	55,698,595
1902.....	31,200,890	1907.....	67,109,393

In 1905 the shipments passed 60,000,000 tons for the first time. In 1906 there was a stoppage of six weeks, pending the adjustment of differences between operators and miners. The lowest shipments shown were in 1902, the strike year. The largest monthly shipments ever reported were in 1907, October showing a total of 6,015,851 tons. Only once before had shipments approached that figure, May, 1905, having reported 6,005,158 tons. It was nearly approached by January, 1903, when mining was resumed after the great strike, and 5,964,950 tons were handled.

The shipments were divided among the three regions, or districts, of the anthracite field as follows:

	1906.		1907.	
	Tons.	Per Ct.	Tons.	Per Ct.
Schuylkill....	16,011,285	28.7	20,141,283	30.0
Lehigh.....	7,046,617	12.7	8,329,658	12.4
Wyoming.....	32,640,693	58.6	38,638,452	57.6
Total.....	55,698,595	100.0	67,109,393	100.0

The percentages have not varied greatly in 10 years, the proportions in 1898 having been 28.8 per cent. from the Schuylkill region, 15 from the Lehigh and 56.2 from the Wyoming. The chief change has been a somewhat slower rate of increase from the Lehigh region.

Making the usual allowance for coal used in operating mines and sold to local consumers, the anthracite mined in 1907 was approximately 76,500,000 tons.

Some of the tin mines of the Erzgebirge (Saxony and Bohemia) were worked in 1907. A prospecting company, after exploring some ancient workings at Fruhbuss, near Neudek, where tin was mined in the seventeenth century, found several veins at a depth of 23 metres. The same company met with satsfactory results at Hirschenstand. Here the abandoned workings were more than 1 km. long, and in a good state of preservation.

The London Tin Market in 1907

SPECIAL CORRESPONDENCE

January opened with apparent firmness at £193 10s. for cash warrants, and £194 15s. for three months; but unfavorable statistics and the weakness in other metals prompted vigorous bear attacks which brought down values by nearly £6. Eastern sellers remained firm, but bears contrived to dislodge large quantities controlled by nervous holders. A sharp recovery, in sympathy with other metals, proved too tempting for holders, and a good part of it was lost. Thereafter the market was sensitive with sharp fluctuations, but with tendency generally toward higher prices. Eastern sellers remained firm and sold sparingly, while consumers awaited developments. Toward the end of the month it became known that shipments from the East were short of expectation, and that a large proportion was going direct to the west coast of America, thereby depleting European supply. Thereupon bears became aggressive, the month closing with sellers of cash warrants at £190 15s., and three months' at £190 10s.

February saw an initial advance of £1 per ton, chiefly due to important orders from America, where stocks had run low. The first few days found bears eager to cover their commitments for February and March. Eastern dealers then proceeded to liquidate their holdings, as they frequently do in view of the holiday incidental to the Chinese New Year, and fair quantities consequently came upon the market which relapsed to £189 5s. for three months' warrants. This proved to be low-water mark; but subsequent fluctuations were unimportant. Toward the close the demand for prompt delivery widened the backwardation to £2 per ton. The month closed at £191 7s. 6d. for cash warrants, and £190 for three months'.

March opened with a firmer market, although without any notable activity. Quietude induced some relapse in values, but an early improvement in the consumptive demand caused a recovery in which the American tin-plate trade played a leading part. March tin suffered in the severe depression caused by panic on the Stock Exchange. Cash warrants were reduced to £180 and three months' to £178. By this time confidence began to be restored and the reduced prices proved attractive to the trade. The result was a sudden improvement of £5 per ton. The market closed with a strong undertone, final values being £184 15s. for prompt and early dates, and £182 10s. for three months'.

April opened with an initial advance of 15s. Values, however, were suddenly depressed in sympathy with a sensational fall in copper. There was a rush to clear out April holdings. The recovery in copper was almost as sudden as the fall had been, and tin was similarly influenced. Conditions were distinctly favorable and Eastern dealers were buying freely in anticipation of better prices. There was a steady improvement up to the end of the month, with good consumptive demand, extensive covering of bear sales and shrinkage of stocks. Closing prices were £195 for cash warrants, and £192 for three months'.

May opened with brisk demand, inspired chiefly by statistics showing a reduction of 2810 tons in the visible supply. Urgent orders raised values and speculative holders thereupon realized freely, Chinese dealers in particular. Prices drifted down, forward metal being freely offered, while available supplies were held firmly in anticipation of American requirements. The backwardation gradually widened, and stood at one time as much as £5 10s. The market was uneventful, and fluctuations were within narrow limits, until a fall was brought about by a desire to depress prices in view of the approaching Banka auction. This took place May 29 and realized £189 7s. 6d. Thereafter good consumption caused an improvement, and the month closed with cash warrants £190, and the three months' £186 5s.

June opened with a disappointing shrinkage in the American demand, and a consequent fall of about £4 in values. This proved attractive; but incipient improvement was checked by a vigorous bear attack, which brought down prices, and sharp fluctuations followed, induced by improved American advices, renewed offering by bears and by Eastern holders, and good consumptive inquiry. June 18 a sensational squeeze of the bears lifted cash values. Eastern sellers, however, were on the alert whenever prices rose, and fluctuations were wide. Thereafter was an uncomfortable time for bears who had open commitments, owing to the difficulty in re-purchasing early prompts. This forced up prices to £192 5s. for cash, and £182 10s. for three months, at which the month closed.

July found London stocks under strong control, and bears covering at advancing prices, the backwardation standing at one time as high as £18. The climax was reached on July 2, when £200 was paid for cash warrants. The arrival of supplies from the Straits relaxed the tension; and values rapidly declined. Investing purchasers then induced a recovery of short duration. Holders of prompt supplies, disappointed at the breakdown in the corner, and apprehensive of the result of further heavy arrivals of Straits tin in London, now sold freely and allowed the backwardation to shrink to £3. Bears meanwhile pushed sales, and were further encouraged by an official announcement that next year's sales of Banka would comprise an increase of 2000 tons. A transient improvement followed; but later prices relapsed in sympathy with those of other metals, and in the absence of speculative enterprise, contrary to usual experience, the periodical auction of Banka tin in Amsterdam was preceded by a firm market and followed by a serious decline. The average auction price was equivalent to £185 10s. in London, which prompted holders in Holland and in the East to offer freely, the result being a relapse to £182 5s. for cash warrants, and £181 for three months'.

August found consumers cautious and the market depressed by heavy offerings from the East; while financial troubles checked improvement. Aug. 15, £162 was accepted, marking a decline of £10 10s. in four days. A recovery could not be maintained in face of the eagerness of importers to market their incoming supplies. The market remained sensitive, closing at £166 15s. both cash and three months'.

September opened with a flat market, but an early influx of orders quickly raised values. This advance could not be maintained in face of heavy offerings induced by the persistent fall in copper. The periodical Banka sale in Holland resulted in an average price equivalent to £169 15s., the month closed with cash warrants at £161, and three months' £157 15s.

October was a troubled month by reason of the financial distress which prevailed in America. The lowest figure was on Oct. 16, when £134 was accepted for three months' warrants. Speculative interests caused a sharp recovery; this, however, was too impulsive to be maintained in the absence of trade demand and in view of the panicky conditions in Wall Street, prices relapsed again. Final values were £146 for spot and £147 10s. for three months'.

November opened under the shadow of heavy realizations, while demand for consumption, particularly from America, was restricted. With a short reaction, prompted chiefly by purchases of Eastern speculators, the fall continued. Another slight reaction stopped for lack of genuine demand, prices closing at £134 10s. and £136, respectively for spot and futures.

December found the market ready for a severe fall, partly induced by the financial depression and partly by the release of large quantities of Banka tin recently sold by auction and pressing on the market. Occasional covering of bear sales caused a rally now and then, but the general trend was downward to Dec. 17, when cash warrants touched £115. This low figure was precipitated by rumors of the failure of large Eastern holders, but it attracted some American orders which turned the tide. The year closed with £123 10s. paid for spot, and £124 10s. for futures.

Operations of El Oro Mining and Railway Co.

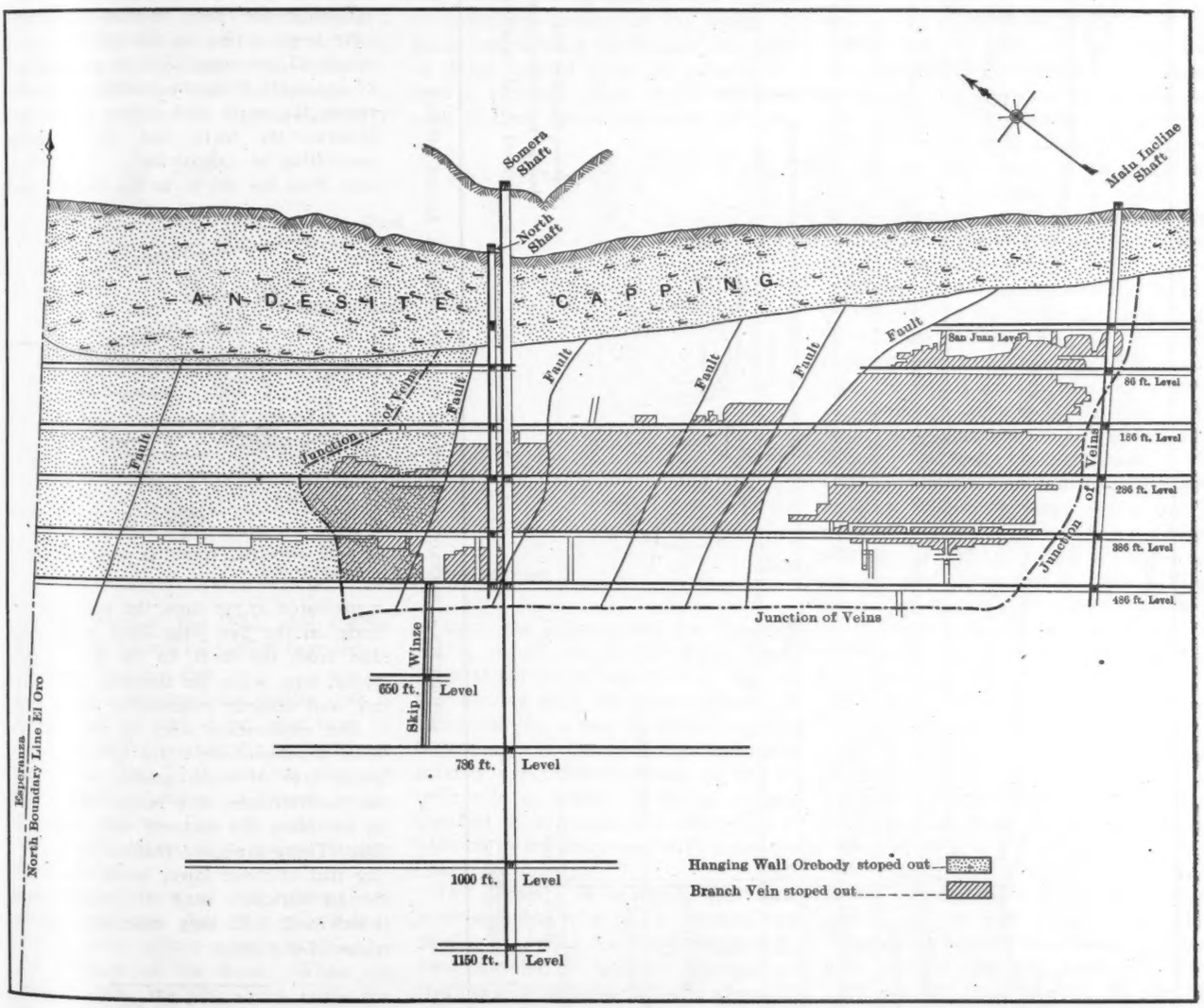
During the Year 269,149 Tons of Ore Were Crushed by 200 Stamps; the Ore Reserves Constitute a Two-years' Supply

ABSTRACT OF OFFICIAL REPORT

The report of the El Oro Mining and Railway Company for the year ended June 30 last is of special interest, as it covers a period during which the whole of the extended plant has been running continuously and none of the profits of operation had to be allocated to writing off expenditure on the new plant.

The receipts from bullion produced during the year were £457,667, and the expenditure at the mine was £269,141. There were other items of income and expenditure, including a profit from the railway, and the actual net realized profit was £221,476. Out of this £162,000 has been distributed as dividend, being at the rate of 15 per cent. on the issued capital, £1,080,000, and £32,058 has been spent on permanent improvements and railway extensions during the year.

The total sum distributed in dividends since the incorporation of the company in 1899 amounts to £842,000, while £308,557 has been provided out of profits for the erection of No. 2 mill of 100 stamps and other extensions and improvements.



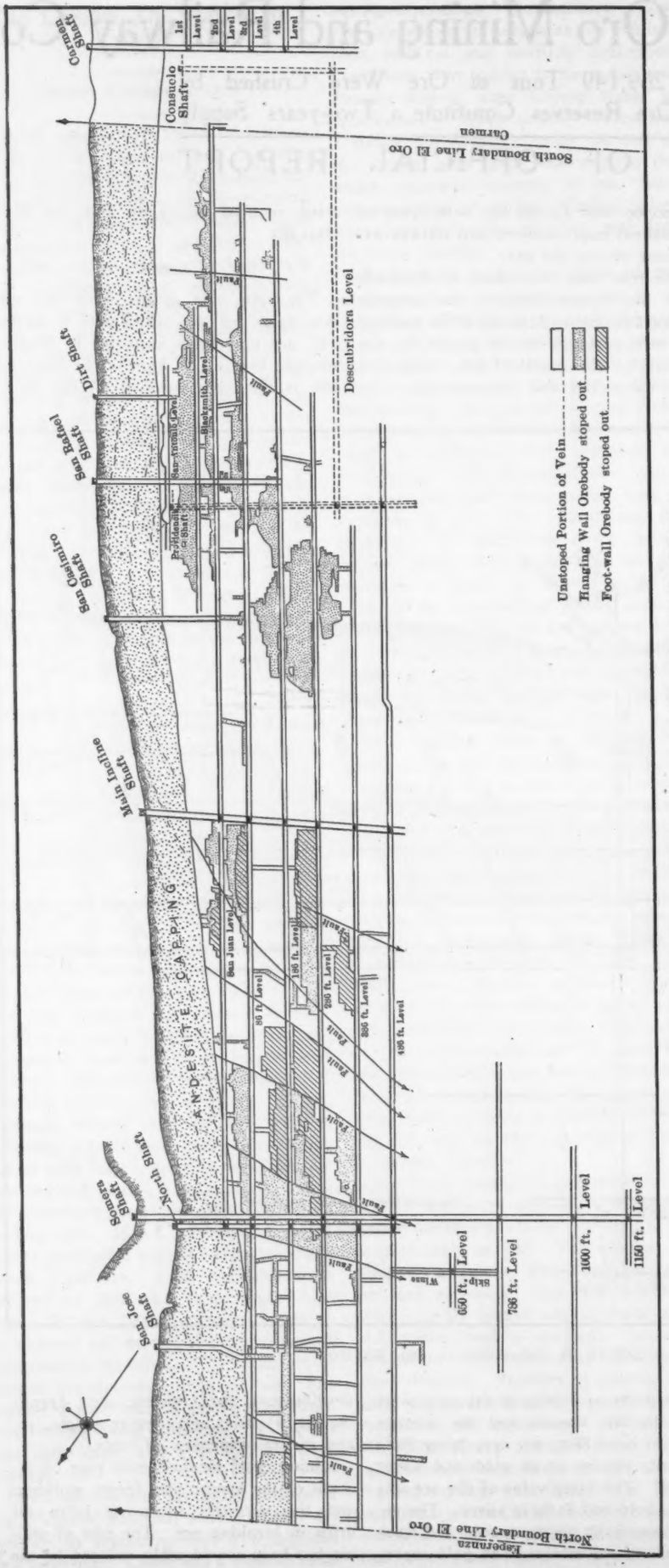
LONGITUDINAL SECTION, EL ORO MINE, EL ORO, MEXICO

During the year 263,149 dry tons were milled by 200 stamps, and the average yield has been $8.53 per ton, being 86.63 per cent. of the gross gold and silver contents. The assay value of the ore was $8.01 in gold and $1.89 in silver. The recovery was 89.87 per cent. gold and 63.05 per cent. of the silver. The gold recovered realized $1,902,185 and the silver $341,283.

Costs.

The total cost at the mine and mill was $4.90 per ton, while with a further 11c. per ton, extra expenses in Mexico, brought the cost to $5.01. The costs per ton at the mine included mining, $2.23; development, 49c.; milling, 43c.; cyaniding, $1.10; taxes, 33c.; water supply, 4c.; and general expenses, 28 cents

Mining costs increase each year on account of the harder ore, deeper workings and the necessity of using more air drills in breaking ore. The cost of milling has been considerably reduced by the



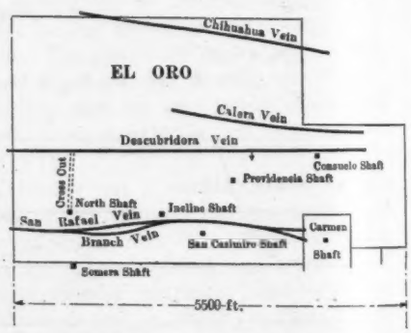
LONGITUDINAL SECTION, SAN RAFAEL VEIN, EL ORO MINE, EL ORO, MEXICO

abandonment of amalgamation and the substitution of weak cyanide solution in the mills instead of the amalgamating plates. The cost of cyaniding has been increased slightly by the addition of filter presses. The increased tonnage crushed has considerably reduced the working costs per ton all round.

The ore reserves on June 30 included 532,523 tons blocked out, which is practically two years' supply. The developments at various points show further large supplies of ore, no estimate of which is given in the report. The accompanying illustrations give sections of the mine which are fully explanatory of the workings.

Operations of the Year

During the year stoping operations have been carried on through the whole length of the mine. The larger quantity of ore came from the middle section between the north and incline shafts and between the 86-ft. and 386-ft. levels, amounting to 136,302 tons. The branch vein from the 286-ft. to the 1000-ft. level



MAP SHOWING VEINS, EL ORO, MEXICO

contributed 27,757 tons, the southern ore body on the San Juan level 30,288 tons and from the 86-ft. to the 386-ft. level 27,898 tons, while the footwall and hanging wall orebody contributed 38,059 tons.

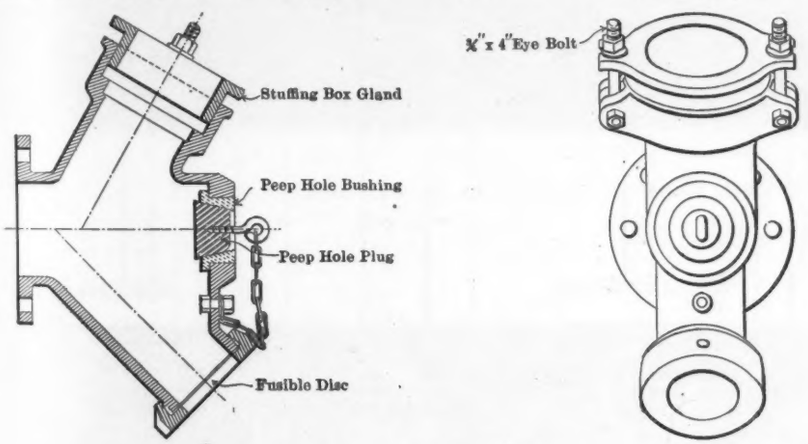
The exploration work at the 1000-ft. level developed important bodies of sulphide ores of much greater value than the oxidized ores now being treated, and at one place the contents were valued at $50. There are good reasons for believing that at these lower levels there will be an enriched zone of sulphur ores which will add very materially to the value of the mine.

London *Engineering* (Nov. 1, 1907) says that the Swedish government expects within a couple of months to be able to supply iron ore for home consumption from the Luosavara iron-ore deposits. The premier and another minister have paid a visit to Luosavara, in order to superintend the survey of the deposits, and to make up the plans of working for the first year.

The Robinson Non-Slagging Tuyere

The tuyere shown in section and elevation in the accompanying illustration embodies new features for avoiding the annoyance caused by the flow of slag into the tuyere pipes of lead and copper blast furnaces whenever the blast is shut off. It has been introduced in several smelting works in Mexico and was designed by Cyrus Robinson, consulting engineer, of New York.

The special feature of the tuyere is an outlet for the slag in the form of an extension from the lower side of the tuyere pipe closed by a disk of easily fusible metal. This emergency slag spout projects downward at a convenient angle and has an inside diameter of 4 in., sufficient to prevent the chilling of the slag before the fusion of the disk provides an outlet. In practice the molten slag never



ROBINSON NON-SLAGGING TUYERE

actually reaches the disk, the fusible metal being melted by radiant heat before the arrival of the slag.

The composition of the fusible disk is 60 per cent. tin and 40 per cent. lead. It is 5 in. in diameter and 3/32 in. thick, and is held in place by a cast-iron ring cap which engages a series of threads on the tuyere extension. The soft metal of the disk, which serves as a gasket, insures a tight joint.

Another feature of the tuyere is a conical peep-hole plug of steel which is held in place against a brass bushing by the pressure of the blast. When the pressure falls, the plug drops inside the tuyere, affording access to the interior. When the blast pressure returns a pull on the chains, which secures the plug to the tuyere casting, restores it to its seat.

The *Paint, Oil and Drug Review* states that for several years the Chilean government has received 20 to 50 per cent. more from the export duty on nitrate alone than the total imports of all other commodities.

Recent Developments in Clifton-Morenci District, Arizona

By A. W. Hixson*

It is only within the last few years that development work in the Clifton-Morenci district, Arizona, has been carried on to any great extent and has brought results valuable enough to encourage further investigations, and to justify the installation of machinery and development on an extended scale. Among the companies which have recently shown activity is the Gold Belt Development and Reduction Company, a cooperative company composed mainly of local men. The shares are so distributed that no one person may be said to hold a controlling amount of the stock. It has a capitalization of $750,000, and holds 25 claims located about 3½ miles northwest of Morenci. Eight shafts have been sunk on these claims but, as yet only two of them, the Bonanza and the Comstock No. 4, are of considerable depth. Both of these shafts are 200 ft. deep, the former bearing gold, the latter copper. In Comstock No. 4 600 ft. of drifting has been done, but the work has been temporarily discontinued because of the interference of water. A pump is being installed to overcome this difficulty. In addition to the shafts and drift there are 1500 ft. of tunnels.

The property is equipped with three gasolene hoists with gallows frames each capable of sinking 800 ft. There is sufficient showing in gold to warrant the erection of a 10-stamp mill with a capacity of 50 tons daily, plans for which are now under consideration. The company has sufficient water to operate a mill without having to pump it from the San Francisco river several miles distant. The company owns its cars and trackage. Located on the claims are several dwelling houses, an office building and a boarding house, while the assay office is at Clifton, where the Shannon smelter handles the copper ore.

The gold ore is being reserved for the new mill. The copper ore is direct-smelting, while the gold ore is free milling. The ores contain chiefly gold, silver and copper, but manganese and zinc are also found in small quantities. The gold occurs chiefly in quartzite while the copper is found as chrysocolla associated with pyrolusite, or as carbonate and glance. As the gold and silver are present in paying quantities the company does not have to depend on the copper alone. Formerly 50 men were employed but since the reduction in the price of copper only 20 men are at work. On the gold claims new ore is being blocked out daily.

Carona Group.

Bordering on the gold belt are six claims known as the Carona group. Most of the work at present is being done on Carona No. 4, where there is a 40-ft. shaft cutting a well defined vein carrying copper and a trace of gold and silver. It is believed that these claims include a continuation of the orebody of the gold belt for the ground is directly east and follows the same ridge.

Among the companies interested in the development of the district the New York & Arizona Mining Company, a stock company with a capitalization of $900,000, owns 30 claims located four miles west of Morenci. At present the two most important claims are the Louise and the Buzzard Shadow. On the Louise there is a 90-ft. shaft, and a drift on the 50-ft. level follows the vein which carries gold, silver and copper in fair quantity. The Thompson shaft which is located on the Buzzard claim, has a depth of 100 ft. The company is sinking another shaft on this claim which at present is about 20 ft. deep. A rich streak of free gold was recently discovered on this claim, but hardly enough work has been done to determine the extent or the character of the deposit. In addition to the shafts mentioned there is a 1200-ft. tunnel known as the Lillian. At present the company is drifting on the vein which runs well in gold and silver. There are also several minor workings showing fair ore. The company is comparatively new and is not yet well supplied with machinery. At present there is one gasolene hoist and 20 men are employed. The company has been hauling its ore to Morenci in wagons, the gold ore being reserved for the new mill which is planned. Before the price of copper was reduced the company made some irregular shipments of copper ore, but the chief dependence of the company is in its gold ores.

The copper ore mined in the Clifton district, Arizona, averages less than 2¼ per cent. copper.

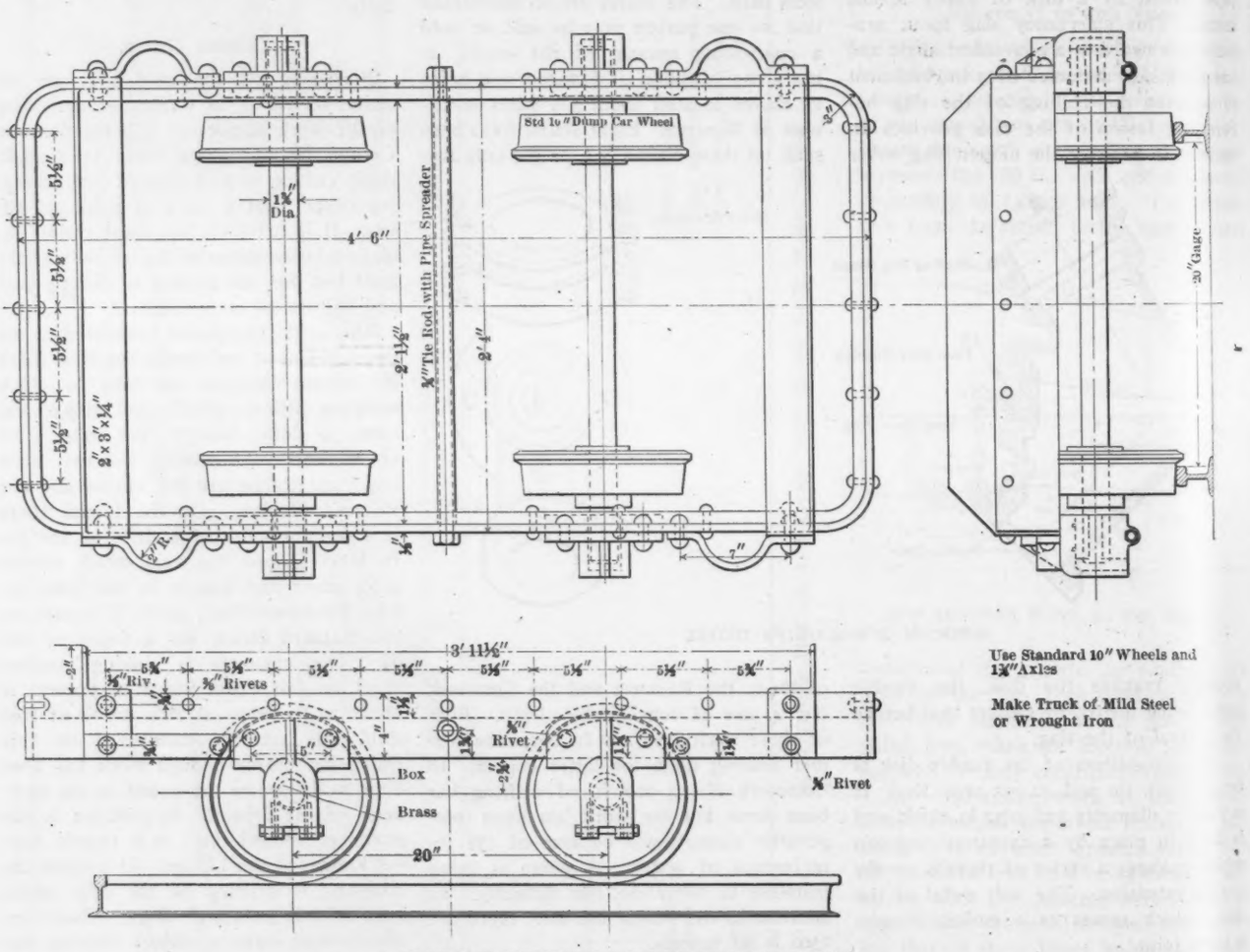
*Morenci, Arizona.

Method of Handling Matte at Selby, California

The Material Is Tapped into Shallow Pans of Steel Carried upon All-iron Trucks Moved by Means of Long Hook Bars

BY JAMES C. BENNETT*

In handling comparatively low-grade mattes, in the quantities produced at silver-lead smelting works, a considerable problem is encountered in the difficulty of securing a satisfactory receptacle. The modified conical pot is unsatisfactory, partially by reason of the expense of renewals, and partially owing to the difficulty of breaking up the solidified matte. In building the new blast-furnace plant at the Selby smeltery it was desirable that a means be developed that would lessen the expense of this operation. This was accomplished by means of the equipment shown in the accompanying illustrations. Since the illustrations are self-explanatory further description of the equipment is unnecessary, but a few notes on the surrounding conditions may be of value.



PLAN AND ELEVATION OF TRUCK FOR MATTE MOLDS

The first effort at this method of handling comprised an all-iron truck of the same general appearance as that shown, but with the difference in detail, that the journal boxes were open-ended and lined with babbitt metal. This served very well while conditions were normal, but when the flow of matte got beyond control and flooded the floor, the babbitt, of course, melted, and the journals of the axles became so pitted and warped that it was necessary to discard them, besides rendering it impossible to remove the truck until everything had cooled. After this experience a brass bearing was adopted in conjunction with the closed-end box. When it is understood that these trucks are moved by hand, by means of hooked bars 8 or 10 ft. long, it will be seen that it is possible to move the trucks even though the matte be flowing at a rate that is temporarily uncontrollable.

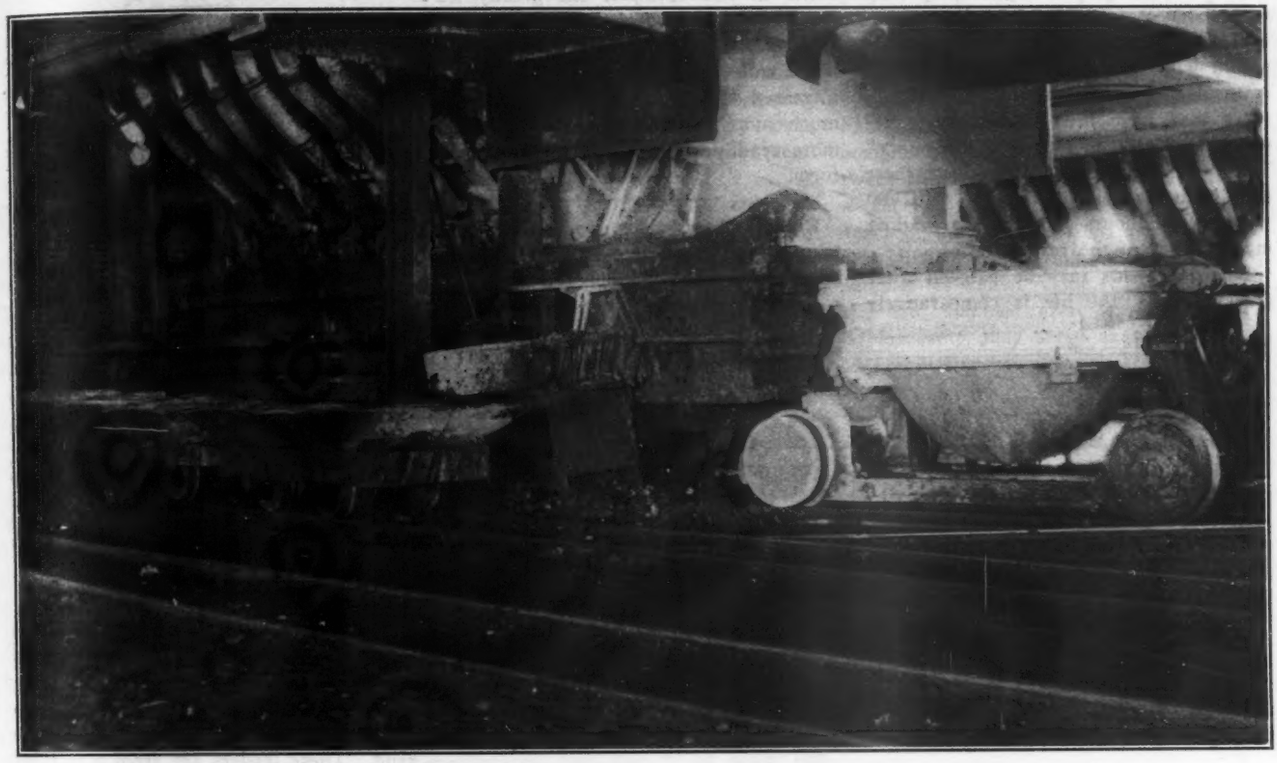
Introduction of the Tray

A further detail of the first efforts was the use of cast-iron pans. A great many of these pans were used, and from several different foundries, but all with the same result, the pans would crack upon the first or second introduction of the matte. Finally it was decided to try pressed-steel pans, with the result that this material has been in constant use since its first introduction.

For a long time it was thought necessary to use a cast-iron plate as a liner, to receive the impact of the falling stream. Latterly, however, this has been discontinued, a shovelful or two of crushed matte being thrown into the mold just before it is to be filled.

At first, the pans cost about $17 each at the factory, but the last order was placed at about $9 each. The excuse offered by the manufacturer for the high

*Engineer, Risdon Iron Works, San Francisco, Cal.

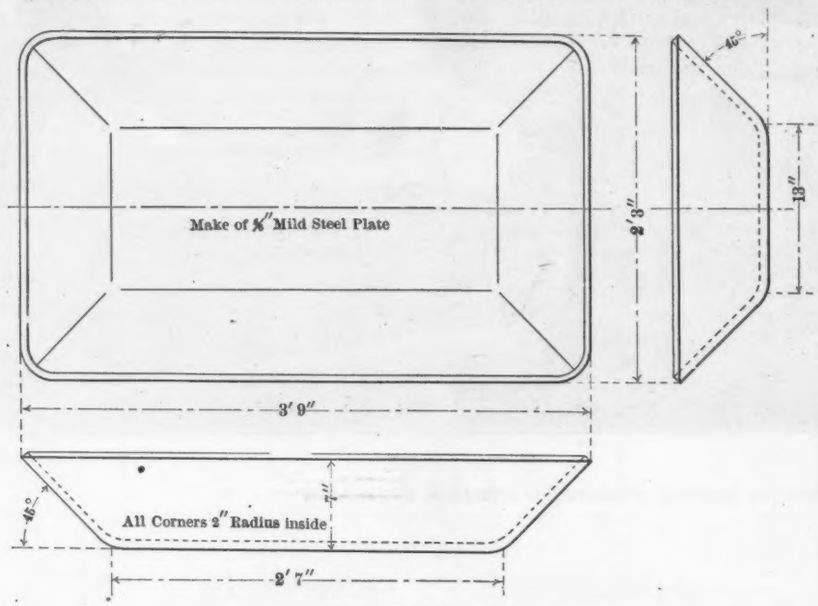


MOLDS AND TRUCK IN POSITION TO RECEIVE MATTE FROM FOREHEARTH

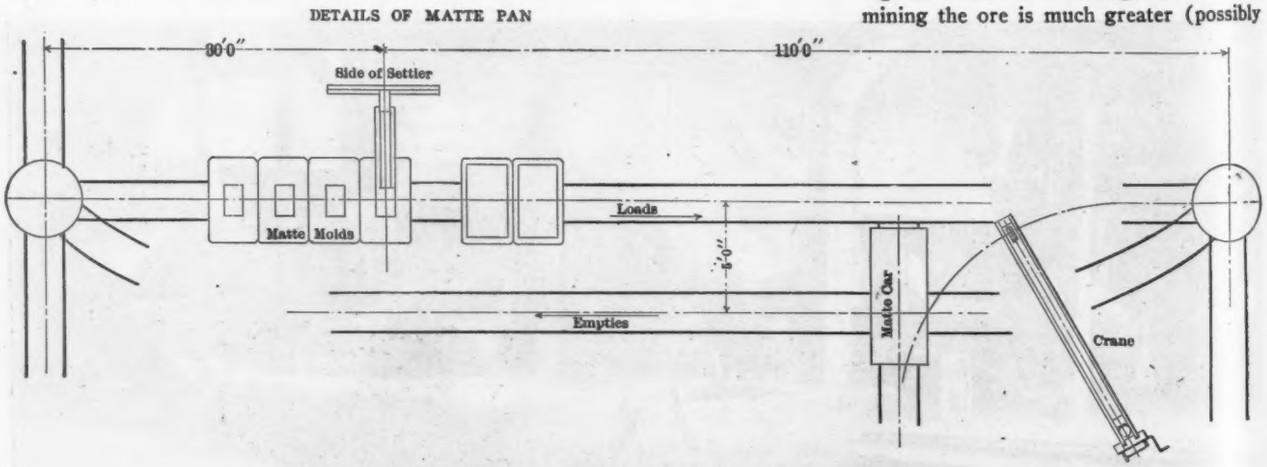
TRUCK WITH MATTE MOLDS OR PANS, SELBY SMELTING WORKS, CAL.

price demanded at first was the heavy expense of fitting up the hydraulic presses with the necessary formers. Since, however, similar orders were subsequently placed with other manufacturers for $9, it seems likely that the first manufacturer may have been laying undue responsibility at the "feet of the formers." The present price per pound for these pans is in the neighborhood of 3¼c., depending, of course, on the prevailing market price of the raw material.

Since the pans may be patched after cracks appear, the life is comparatively



DETAILS OF MATTE PAN



ARRANGEMENT OF TRACKS AND CRANE FOR HANDLING MATTE

long, some having been in use for nearly two years. While this particular design may be unsuitable for other plants, the use of pressed steel permits of wide variation in design, so that it is possible to suit many different conditions.

One small copper smeltery has recently adopted the use of pressed steel; the pans are made on the general lines of copper molds, except that they are shallower and wider, this form being less expensive to manufacture than that of the narrow and deep mold.

Aside from the reduced cost of renewals, the great advantage of casting the matte in this form, is the greatly lessened work of breaking up the cakes for shipment or for further handling, as compared with the conical form. The greatly increased surface causes the matte to cool much more rapidly, and to disintegrate more readily than in the more compact form.

Recent observations on underground temperature in the Pas-de-Calais coalfield have shown that the temperature increases 1 deg. C., not with every 31 m., as has hitherto been thought, but only with every 56 m. At a depth of 1200 m. the temperature in a borehole was 35 to 40 deg. C. An electro-magnet has been successfully used in recovering a broken drill from the bottom of a borehole.

According to *Rev. de Chim. Ind.*, December, 1907, in a recent discussion in the French Chamber, M. Maizières estimated the production of phosphates for 1907 at 4,300,000 metric tons. The world's manufacture of superphosphate absorbs all that can be supplied.

Extension of European Coalfields

According to the *Mining Journal*, Dec. 28, 1907, the hidden coalfields in the Midlands, England, have been discussed by Professor Lapworth, who believes that the collective area of the unproved hidden workable coalfields is larger than that of the visible and proved coalfields combined. A discovery of national importance was the striking of coal by H. W. Hughes on Jan. 28 at Baggeridge Woods. The story of the discovery of the southeastern coalfield was told by Prof. W. B. Dawkins at the Society of Arts. So far at Dover 13 seams with an aggregate thickness of 22½ ft. have been proved. Valuable memoirs descriptive of the coalfields of South Wales and Leicestershire have been issued by the Geological Survey. Rapid progress is being made in the development of the coalfields of North Belgium and of French Lorraine, and fresh discoveries of coal have been reported in Natal near Umlalazi, in Russia, and in Rumania at Bucharest.

Resueing (blasting waste and ore separately) is used in working the Main Reef leader at the Jumpers mine, Witwatersrand. These leaders are from 2 to 6 in. wide. They are defined by well-developed partings, a fact which greatly aids resueing. The face in the waste rock is kept several feet ahead of the ore face. The waste is packed in the stope before blasting the ore. In resueing, the cost of mining the ore is much greater (possibly three times as great) than if the ore and waste were broken together. But owing to the smaller amount of rock to be hoisted, the avoidance of surface sorting and the higher grade of ore sent to the mill, it is possible by resueing to mine, on the Rand, ore which otherwise would not pay.

An article in *Stahl u. Eisen* states that by causing the metal to solidify very slowly, a good, hard cast iron, rich in graphite, may be obtained from ores containing much manganese.

Some Characteristics of Natural Graphite

By Frederic S. Hyde*

Natural graphite occurs in massive, flaky, argillaceous, needle-shaped, amorphous or granular forms. The ore varies from the dull grayish-black earthy mass, more commonly found in the younger rocks, to the black-crystalline graphite found in the older rocks. The physical condition of the graphite affects its use in the arts and industries.

Ceylon plumbago excels in the combined excellence of its luster, refractory quality, lubricating and polishing properties; other forms of graphite rarely approach this degree of excellence. A sample of graphite may possess the proper luster and unctuous properties, and yet be lacking in other respects; it may be too hard and crystalline for pencils, too micaceous for crucibles, or too granular and earthy for lubrication. Again, the material may have excellent lubricating properties, and not be refractory enough for the manufacture of "steel-pots."

The physical peculiarities such as the refractory quality, the fusibility of ash, the structure, and the property of binding with other materials, are equally as important as the percentage of carbon. The Ceylon plumbago will generally mix better with a given clay and will form a stiffer "batch" with better binding properties than some American flake-graphites which, on account of peculiarities in structure, refuse to bind; hence Ceylon plumbago is generally used for crucibles, retorts, etc. The most lustrous sample is not always the richest, although the brilliant, flaky product obtained by milling may appear to be very pure. Some forms, after pulverizing and separating, yield a flake which, under the microscope, is apparently free from impurity or grit; yet, when subjected to oxidation before the blast these may show an extraordinary amount of ash, possibly 30 or 40 per cent. This is present in the flake itself as a part of its structure and bears the same relation to graphite that cinders do to coal. A distinction should be made between the internal ash and the external grit.

Neither milling nor mechanical treatment can completely remove this ash; only by chemical treatment can it be eliminated. So long as it is possible to obtain high-grade natural graphite or plumbago containing 98 per cent. carbon, the use of any chemical process will be restricted to low-grade ores and those purified for special work.

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Physical, Rather Than Chemical, Properties are Desired

As a rule, graphites containing 90 to 95 per cent. graphitic carbon are sufficiently pure to meet the requirements of the general trade. Natural lubricating graphite, sold in the dry or flaky form, rarely contains more than 90 per cent. graphite.

The removal of the ash content by chemical treatment would undoubtedly result in a softer and more pliable flake, which might be a matter of importance for internal or cylinder lubrication. However, physical, rather than chemical, properties seem to govern the choice of graphite, and an 85 per cent. Ceylon plumbago may prove superior to a 95 per cent. artificial product so far as general application and selling qualities are concerned. For some purposes such as for use in foundry facings, the presence of silicious material may act as a positive benefit by causing the graphite to cling or spread better on the surface of the mold. This also depends on the kind of graphite, its degree of fineness, and its structure, whether flaky or granular. As a matrix in which to imbed filaments or delicate objects to be subjected to high temperatures, 2500 deg. F. or more, the graphite should contain as little ash as possible in order to avoid any danger of vitrifaction or congealing into fused masses or globules which might prove detrimental to the objects treated.

To distinguish one variety of graphite from another, when both have been subjected to a milling process or reduced to the same degree of fineness, is a matter requiring considerable experience; yet the differences, in many instances, are fairly striking to the practiced eye.

To avoid hasty conclusions, the material should be examined microscopically and comparisons made with known standards. Some men, with years of practical experience, pretend to differentiate various grades by a method of tasting or placing the substance in the mouth. They claim that differences in structure or quality can be noted by the sensitive surfaces of the tongue. But such methods would hardly distinguish Alabama flake graphite from that of New York or Pennsylvania, when both have been ground to the same size.

Taste and Odor Merely Guides to Quality

Graphite, like certain other minerals, possesses an odor more noticeable perhaps when the material is moistened or mixed with plastic material. Likewise the dust from Mexican graphite is generally milder and less disagreeable to breathe, during the grinding process, than the dust from Ceylon plumbago. A wet clay-graphite mixture, especially when first moistened, generally emits an agreeable blended odor due to both clay and graphite and this odor is rather pronounced in the case of the Travancore variety of plumbago.

Taste and odor cannot, however, be considered as conclusive tests. More reliable information can be obtained by compressing and rubbing the material between the fingers or by spreading it on a piece of paper with a spatula and observing smoothness, luster, compactness, etc., and by comparing it with similar samples of known value. The color of the ash, obtained after oxidation over a blast-lamp, may serve as a guide, together with the physical structure, in reaching a definite conclusion. When a flake graphite sample, such as is sold for lubrication purposes, possesses a thinly laminated structure and yields a micaceous, light or buff-colored ash approaching "muscovite" in composition, it can generally be regarded as of American origin; such graphite is found in Alabama, Pennsylvania, New York, and parts of Canada. The so-called Mexican graphite has a different character. It is compact, dull in luster and yields a white or grayish-white ash more or less granular and siliceous.

Characteristics of Various Graphites

Ceylon lump, when ground to flake, leaves on oxidation a granular ash-residue which is brick-red to dark brown in color. About one-half of this residue is silica; the rest consisting of iron, alumina, and alkalies in combination with the silica. Small amounts of magnesia (0.1 to 0.2 per cent.) are generally present. Sulphur, in combination with iron as pyrites, will average about 0.2 per cent. in the original lump form. Alaskan and Norwegian lump may bear a very close resemblance to the poorer grades of Ceylon; the color of the ash may be identical in each case, but the Alaskan, as a rule, is likely to be more gritty and poorer in graphite, while the Norwegian may be full of free sulphur in a finely divided condition, although readily ignited in certain cases. In Ticonderoga graphite, magnesia is quite noticeable as a constituent of the ash. In some cases this amounts to 7 per cent., which is equivalent to 1 per cent. or more of the original sample. The Ceylon variety contains, generally, one-tenth as much magnesia. The Ticonderoga ash also carries a greater percentage of combined alkalies which tend to increase the fusibility of the material as soon as the surrounding graphite becomes oxidized or "burnt out."

In general, the ash may be considered as a silicate containing iron, alumina, magnesia, and the alkalies, some free silica and small amounts of pyrite. Alabama flake graphite generally possesses a steel-blue or grayish-black luster as

compared with the darker shades of other flake products, while the ash residue is flimsy and of a flesh tint or terra-cotta shade. However, numerous comparative tests are necessary in judging material as sold on the market, especially when in admixture with other grades which tend to vitiate the results and prevent any definite conclusion as to the origin of the product.

Chemical Tests

The behavior of graphite with certain reagents is interesting. The graphitic oxide test, in which a small amount of finely pulverized graphite is treated at 60 deg. C. with a mixture of potassium chlorate and anhydrous nitric acid (the latter obtained by distilling c. p. nitric acid with an equal quantity of concentrated sulphuric acid), serves to distinguish it from other forms of carbon by producing a grass-green oxide, which ultimately may be transformed to the yellowish graphitic acid, noted for its tendency to deflagrate just below a red heat.[1]

Fusion with alkaline carbonates produces carbon monoxide (CO), which puffs through the molten material and ignites as fast as formed, the graphite being consumed in reducing the carbonate. Pure molten caustic-alkali, at a low red heat, does not attack graphite appreciably but separates it from its mineral constituents and leaves the graphite in a free and purified condition. Thus pure graphite may be obtained and its percentage determined by direct weight.[2] Pure graphite is not altered by heating in a stream of dry chlorine gas; nor is it affected by hydrofluoric or hydrochloric acids.

Graphite, of the best quality, such as the Ticonderoga flake or powdered Ceylon plumbago, is but slowly attacked by molten potassium nitrate at a low red heat. Certain metallic oxides, upon the surface of molten metal or alloys, at very high temperatures, have a tendency to oxidize or "burn out" graphite; and the same is true with respect to strongly oxidizing slags which have high melting points. Therefore, plumbago pots for melting steel rarely average more than 6 or 7 heats, while pots for melting brass may outlast 18 or 20 heats.

Graphite may be completely oxidized by a mixture of chromic and sulphuric acids. It may also be converted to carbon dioxide in a combustion furnace, but a far simpler method is to heat the graphite directly in a platinum dish over a Bunsen flame while a gentle stream of oxygen plays on the surface of the material.

[1] *Vide Journ. Soc. Chem. Ind.*, Mar. 31, 1904.
[2] *The Mineral Industry*, Vol. IX, 1901, p. 380.

Bad Effects of Sulphur

In the assay of graphite, allowances should always be made for moisture, combustible organic matter, and sulphur. Sulphur is an undesirable element in plumbago pots, used for melting silver or high-grade alloys. In fact, sulphur in the form of pyrites should always be eliminated as far as possible in the milling process. It is not unusual to find red spots on kiln-burnt pots, due to the iron roasted out of the pyrite. Small plumbago crucibles, when subjected to a clean blast in a gas furnace, at a yellow heat, often exhibit fused pittings due to fluxing of iron oxide with mineral matter; and this is generally the case when the plumbago is known to contain pyrites even in very small amounts.

Gold Movement in Great Britain in 1907

The following notes on the gold movement in Great Britain in 1907 are from the annual circular of Messrs. Pixley & Abell, of London:

"The year 1907 will be memorable for the financial crisis in the United States which, after threatening for many months, became dangerous during the last two months of the year, and caused great disturbance in the money markets of the world. The bank rate, which stood at 6 per cent. at the beginning of the year, was reduced to 5 per cent. on Jan. 17, to 4½ per cent. on April 11, and to 4 per cent. on April 25. It stood at this level until Aug. 15, when the rate was raised to 4½ per cent. On Oct. 31 on the commencement of the panic in New York, the rate advanced to 5½ per cent., and on the following Monday, Nov. 4, to 6 per cent. A further rise took place on Nov. 7 to 7 per cent., a rate that had not been touched since the year 1870, and at this it remained until the close of the year. The average for the year was 4.927 per cent., as compared with 4.274 per cent. in 1906.

"The arrivals of gold from all quarters amounted to £55,600,000, against £46,000,000 in 1906 and £38,567,000 in 1905; while the total exports were £50,000,000, as compared with £43,000,000 in 1906 and £30,829,000 in 1905. The imports from South Africa amounted to £29,389,000, against £25,713,000 the previous year, an increase of over 14 per cent.

"The Indian demand for small gold bars was again large, and amounted to £5,700,000. Shipments were especially heavy during the first nine months of the year, but the inquiry slackened later on when the trade conditions became unfavorable owing to the great drop in the exchange.

"The price of gold remained at 77s. 9d. until the middle of March, when it was raised to 77s. 10½d. to prevent the arrivals from being taken by New York. When this demand had been arrested the price fell once more, and remained at the minimum until the middle of May, when the inquiry for Paris in repayment of loans made to England at the close of 1906 caused an advance to 77s. 10½d. There were no important demands then until August, when France again became a buyer, and this continued with intervals until October. On Oct. 28 the American demand began, and the price of gold rose to 78s. and from then on there was no reduction of importance until the end of the year, when the rate fell to 77s. 9½d. on the cessation of American purchases.

"The amount of gold bought by the United States in England was about £15,500,000, and in addition they bought supplies from other countries, so that the total shipments during November and December from this country were nearly £18,000,000. The high bank rate proved most effective in attracting gold to England to fill the vacancy caused by the withdrawals on American account, and in addition to £3,000,000 received from France under similar conditions to those made at the end of 1906, the bank received from Germany nearly £8,000,000, besides large amounts of Scandinavian coin.

"The exports to Argentina were again large, and amounted to just under £7,000,000. Egyptian requirements were also heavy and, in addition to gold which was shipped from India, also took nearly £4,500,000 from England. Turkey also took £750,000.

"Early in January the India Council added to their holding in London £1,000,000, but released £1,500,000 later in the year against silver purchases. In November and December they released further £2,500,000 in consequence of the falling off in the demand for India Council bills, and the gold reserve in London now stood £3,650,000 at the close of the year."

A retaining wall should be designed to withstand the maximum thrust of the earth. About 90 per cent. of the failures of retaining walls are caused by poor foundations. One should determine first the total pressure, second the direction of its action, third its point of application. If the point of application be taken as two-thirds the distance from the bottom, the maximum overturning moment will be obtained.

According to press despatches from Swansea, the South Wales steel bar trade has practically ceased through American competition. It was announced on the Metal Exchange of Swansea from the United States, Jan. 14, that 10,000 tons of steel bars had been booked for shipment and that the first consignment was due to arrive shortly.

The Boston Consolidated Mining Company

The following is an abstract of the report of Samuel Newhouse, president of this company, for the fiscal year ending Sept. 30, 1907.

Sulphide Mine

The development of the Sulphide mine has advanced with satisfactory results. Most of this development has been north of the Armstrong No. 1 level, and east of the Work and Kiffie levels, and has resulted in opening four stopes, known as the Mott, Schirmer, Porges, and Phœnix. The Mott stope is a continuation of the Newhouse orebody on the Armstrong level, and has proved that orebody for 260 ft. on the dip. The Schirmer stope, east on the Work level, has exposed an orebody 80 ft. on the strike, 30 ft. thick, and 120 ft. on the dip. The Porges stope is east upon the Kiffie level, and has an orebody 70 ft. along the strike, 25 ft. thick, and 90 ft. on the dip. An encouraging feature of last year's development was the discovery of a large body of ore upon the Armstrong No. 1 level, and also of ore lying east of the main easterly fault which has heretofore limited the orebodies. Because of these promising features there is reason to expect the discovery of further sulphide bodies in the lime territory lying east of the present workings.

During the year there was delivered and sold to the Bingham Consolidated Mining and Smelting Company 11,918.65 tons sulphide ore, containing 1,405.49 oz. gold, 9,879.44 oz. silver, and 508,862 lb. of copper, for which was received, after deducting transportation, smelting and refining charges, the sum of $95,162.51.

There was also delivered to the Garfield Smelting Company 122,386.44 tons of sulphide ore, containing 11,236.96 oz. gold, 68,249.47 oz. silver, and 5,638,063 lb. copper, making a total of 134,305.09 tons of sulphide ore, containing 12,642.46 oz. gold, 78,128.91 oz. silver, and 6,146,925 lb. copper.

The cost of mining this ore, including development, was $314,584.68 (or $2.34 per ton); transportation to smelters, $67,755.78; smelting, $354,400.43; freight and refining charge upon bullion, $97,734.54; total, $834,475.43.

After crediting the value of gold and silver, 12,642.46 oz. gold at $20 per oz., or $252,849.22, and 78,128.91 oz. silver at 64c. per oz, or $50,002.50, a total of $302,851.72, there remains to be applied to the cost of production of copper, $531,623.71, or a cost of 8.65c. per lb.

The inadequate and erratic railway service afforded by the Rio Grande Western and Copper Belt Railways, due to insufficient preparation on the part of these companies to meet the increased demands of Bingham shippers, kept shipments far below the tonnage it was intended to move; the uncertain car supply served to increase the mining cost.

Porphyry Mine.

With the beginning of the last fiscal year one steam shovel was in operation, and since that time three others have been added, starting operations respectively, Oct. 6, 1906, Feb. 21, 1907, and March 16, 1907. During the last year these shovels stripped and removed 2,011,733 tons of capping. There was expended for this service, including supervision, drilling, railway operation, repairs, machine shop expenses, water line expenses, the sum of $215,107.40 for labor, or a labor cost of 10.69c. per ton. There was expended for explosives, fuel and other material involved in the operation, the sum of $152,177.34, or a cost of 7.56c. per ton, making a total cost of 18.25c. per ton for mining, removing and disposing of the capping. Miscellaneous expenditures amounting to $12,290.78, not properly included in above-mentioned items, were made. The total expenditure upon this work was $379,575.52.

"I wish to direct your close attention to these figures because in our former reports estimates were made that mining could be done with steam shovels at 40c. per ton. Our engineers estimate that the quantity of capping to be removed and disposed of is approximately one-half the amount of the ore tonnage. Hence it will be readily seen, based upon last year's experience, that our mining costs, including removal of capping and mining of ore, are well within our first estimates."

The steam-shovel equipment has been increased by the addition of three 90-ton Marion shovels. Upon steam-shovel equipment there has been expended $72,980.90. Seven shovel bench levels are now operated with tracks all connected to a common system. Upon railway trackage and equipment during the year there was expended $129,665.54.

An incline tramway extending from the 60-ft. steam shovel bench down the mountain side, a distance of 2,050 ft., to an ore-loading station located upon the Carr Fork Railway track has been constructed. This tramway includes a double road-bed, carrying four tracks laid with 60-lb. rail, 36-in. gage, and is in reality two complete and separate systems side by side. It is equipped with two Stine patent double lowering drums at the top terminal, and fitted with receiving and loading bins at the 60-ft. Minus bench, and at the 160-ft. bench. It is equipped at the Carr Fork receiving terminal with a 3000-ton capacity steel ore bin.

The skips operating upon the tramway carry 13 tons each, and are capable of making a round trip each three minutes. The carrying capacity of this tramway is equal to 6000 tons of ore per day. There has been expended on its construction and equipment $52,504.63.

In order to secure connection with Rio Grande Western Railway tracks, it became necessary to build a standard-gage track from the auxiliary yard up to Carr Fork, a distance of 2700 ft. This was an expensive piece of work, as it required the construction of 250 ft. of railway tunnel, timbered throughout, a 215-ft. railway bridge, and 1000 ft. of rock cut. On September 30 this work was about 70 per cent. complete, and there had been expended upon it the sum of $28,505.03.

Garfield Mill

The construction of the Garfield mill has rapidly advanced and with the close of the fiscal year the steel buildings were complete, the crushers, conveyers and stamps were in position, and 30 per cent. of the concentrating tables were erected and adjusted. The power sub-station was approximately complete and awaiting arrival of apparatus. The pump house was completed, and is awaiting arrival of pumping machinery. A water reservoir holding 1,000,000 gal. is completed.

Aggravating and serious delays on the part of manufacturers have been the source of constant contention during the construction of this mill. The last of a large order of shafting due for delivery in January, was shipped from the mills on Oct. 10. The transformers for use in the power sub-station, due in April last, have been received within the last 10 days. Water-pipe due in March last still lacks three carloads of completing shipment.

Mill expenditure to date is $1,468,901.91.

"Your company has now arrived at the point of commencing the production of copper on a very large scale from its Porphyry mine, and is in position to maintain a heavy tonnage of ore from its Sulphide mine. It has nearly finished its improvement expenditures, and while facing at the present time a depressed and unsettled copper market, I do not hesitate to say that your mines can and will earn substantial profits even at the present market price of copper. Our engineers have conservatively figured 58,000,000 tons of workable and payable ores now contained in the company's mines. The mill will consume when operating at its fullest capacity but 1,080,000 tons per year of this vast quantity, which involves a period of 50 years of active operation for the conversion of ore with our present plant. In possession of one of the largest copper properties in the world, substantial results are limited only by the capacity provided for the treatment of the ores. The company is in a position to mine double the amount now required by the mill."

Pittsburg's Speculation in Mines

Conclusive evidence has come to hand within the past few days, says a correspondent of the *Evening Post*, that another mining property, in which Pittsburg capital was largely interested, and which gave great promise six months ago, has been added to the long list of disappointments. This is the Interior Mining and Trust Company, with an authorized capital of $3,000,000 and stock outstanding amounting to $2,421,898. The stock was listed on the Pittsburg Stock Exchange in September, 1906, and, starting at 31c. per share, was gradually advanced to 96c. last July. Much money was expended in installing a stamp mill and other machinery, and the result of operations ultimately convinced the directors that previous expectations were not being realized.

Accordingly, several directors visited the property and have just returned with the announcement that the Pittsburgers were misled at the beginning, but they express the conviction that the property is now a fair prospect. The probable losses entailed on the venture approximate $1,000,000. The price of the shares rapidly depreciated in the recent panic, and reached 10c., while a block of over 100,000 shares was transferred this week from the president of the company to one of the directors at a price said to have been 5c. per share.

This is cited as a sample of the propositions which have been financed in Pittsburg the past three or four years. Conservative interests, who have means of somewhat accurately knowing the extent of the city's participation in the mining stock boom, estimate that Pittsburgers have lost fully $25,000,000 actual cash within the last five years. The estimate is probably too low. At any rate, the amount of Pittsburg money lost in mining ventures has done much in crippling a decidedly large proportion of the general public. Some of the brightest and shrewdest business and professional men have been embarrassed by unwise investments in mining securities. The prominence of the men affected by these disastrous ventures has added much interest to the developments, and great surprise has been expressed that they should be identified with such highly speculative enterprises.

There is not a State in the West which does not contain several properties in which Pittsburg capital is interested, and few of the Nevada companies were financed without at least some assistance from this city. In addition, Pittsburgers invested in mines in British Columbia, Alaska, the Yukon district, Cobalt, all sections of Mexico, the Central American republics, Cuba, Santo Domingo, Brazil, the Philippines, and other distant quarters. Frequently money was invested on the most superficial knowledge by men identified with the leading business and manufacturing companies who, in their own lines, make the most rigid examinations of all details connected therewith.

The Larder Lake District, Ontario*

This paper, Professor Brock states in a note, is merely tentative and subject to revision. It deals largely with the geological features of the region, noting that the rocks bear a strong resemblance to those at Cobalt, the chief difference being that none of the upper members of the Huronian are represented; but on the other hand the Keewatin contains a more varied assemblage of rocks. These are both of igneous and sedimentary origin, highly disturbed and metamorphosed, the most interesting from an economic standpoint being a rusty weathering dolomite about 60 per cent. of which consists of lime-magnesia-iron carbonate, the remainder being of quartz; and a soft green talcose silicate probably serpentine. This rock, especially where cut by porphyry or pegmatite, is traversed by innumerable stringers of quartz, which in places are gold-bearing. Pegmatite dikes are numerous in the Keewatin. The country rock in the neighborhood is apt to be somewhat silicified and mineralized, and occasionally gold is found, as in the Gold Hill claim. The claims which were considered locally to give most promise and to be typical of the camp were inspected. Most of the showings occurred in the band of rusty weathering dolomite where seamed with quartz stringers, or in the Keewatin where mineralized with quartz or similar dikes. Some of the quartz veins were several feet wide, swelling out in places to large masses of 10 or 12 ft. in diameter.

Occurrence of Gold

The quartz veins seen by the writer looked very lean and where sampled gave nothing but a trace, except some picked specimens rich in sulphides, which might go a few dollars per ton in gold and silver. On the Gold Hill claim, which has yielded fine specimens showing free gold, the country rock is diorite cut by pegmatite. The claims on the silicified band of rusty weathering dolomite that show values have much the same characteristics. The stringers are sometimes predominantly parallel to the strike, sometimes predominantly across it, and sometimes irregularly distributed. The oxidation of the quartz does not usually extend an inch in depth. The free gold is generally sprinkled in fine particles, but sometimes in grains the size of a pea or in little plate-like masses. At the bottom of two pits on the Knott claim, 14 ft. below the surface, the gold seems to be as abundant as at the surface. On the Harris-Maxwell claim the gold occurs in the quartz, particularly around galena, or near a small dike of black trap-like material which cuts the quartz. On the Reddick claim two sets of quartz stringers occur running for the most part across the strike. Those having a vertical or slightly westward dip are of white milky quartz which carries some free gold.

Development Work

Very little development work has been done, so that it has not yet been proved what run-of-mine might be expected from any place. Some of the stringers are quite rich, but appear too small and irregular to be mined by themselves, and apparently the whole rock would have to be taken. Over what area such material could profitably be mined and what it would run can only be satisfactorily determined by mill tests. As it has been impossible to get complete plants or to send out trial shipments, no such tests have been possible. One small mill on the lake, run on a custom basis, could probably furnish all the companies the information necessary regarding what might be pay ground, and whether it would be desirable to erect mills on their own properties. Often when the dolomite is well cut by stringers and apparently promising, samples fairly taken will not yield values sufficiently high to warrant further attention; but as it forms a long continuous band a little north of the lake and presents exposures at other places, there is a considerable area over which values might be found. Though the stringers with gold are small and irregular and make a workable ore uncertain, there seems to be a reasonable chance that, by mining the whole rock at some points, a large tonnage of low-grade ore may be developed with perhaps occasional rich bunches. With sufficient tonnage and good transportation facilities, even $3 per ton might be made to pay.

The showings so far discovered are all in the Keewatin rocks, the main mineralization having been accomplished in pre-Huronian times. The undisturbed Lower Huronian is absolutely barren, but where disturbed by faulting and large intrusions of the later diabase, it might be mineralized; such being the conditions at Cobalt. There is little possibility of modern placers being encountered, heavy glaciation having removed and scattered further south the loose material and rotted rock surfaces. Since the glacial era, but little weathering such as might occasion the concentration of gold in sands and gravels has taken place.

*Abstract of paper in Annual Report of the Ontario Bureau of Mines, 1907, by R. W. Brock, geologist and acting director of the Geological Survey of Canada.

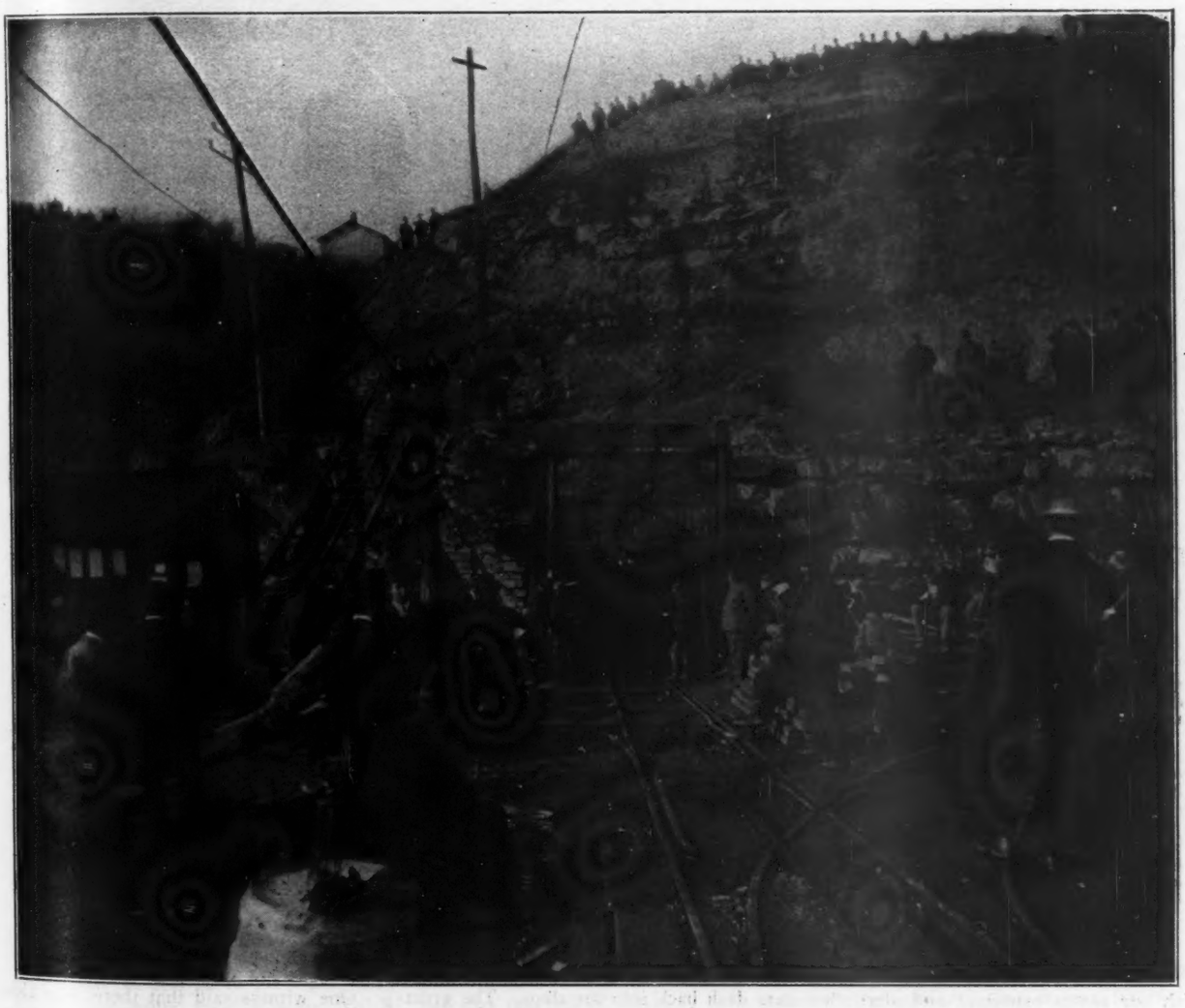
According to *Echo des Mines*, the exportation of asphalt from Trinidad was 205,874 metric tons in 1907 against 103,708 in 1906.

Results of Inquiries into Recent Mine Disasters

Inquests and Investigations Have Brought No Definite Conclusions. Dust Has Been the Destructive Factor in the Explosions

BY FLOYD W. PARSONS

At last the general public, and especially those directly interested in mining are alive to the constant dangers that menace the lives of men employed in our coal mines. Great interest is evinced in the findings of the various inquests following the several serious disasters which have recently occurred, and the decisions reached are being analyzed with greater care than heretofore. Never has there been such serious thought and study for the purpose of reaching a solution that will make our mines safer and will prevent the losses of life and property that have been so frequent.



MOUTH OF SLOPE AT MONONGAH MINE NO. 6

Causes Remain Unknown

To those whose knowledge has not been acquired by experience and through actual contact with the mines, it may seem that after dozens of mine managers, superintendents and engineers have spent days in carefully studying conditions and results, that some general definite opinion should be formed. To realize the difficulty attending the solution of a mine-explosion problem, it is only necessary to inspect the interior of a property that has suffered from such a disaster and then see how conflicting and misleading the visible evidence can be.

In a local explosion such as occurs in anthracite mines and in some bituminous operations, it is often possible to discover the direct cause of the accident, but in a property where all the miners have been killed and where the workings have been seriously wrecked, the problem is more difficult. The cause of the Monongah explosion remains unknown. Concerning the Darr disaster in Pennsylvania, still less is definitely settled.

In order that the greatest good may be accomplished, the inquests concerning mine explosions should be conducted by impartial mine experts, and the juries who are expected to decide from the evidence submitted, should comprise experienced mining men whose knowledge of general and technical mine problems is such that all evidence submitted will be given proper consideration from the standpoint of an engineer rather than from the understanding of an ordinary layman.

Conflicting Testimony

The workings of the human mind are

peculiar, and the general impressions experienced by a number of witnesses in the case of an unusual accident accompanied with much excitement and conjecture are always found to differ radically. I remember standing with two men when an explosion occurred in adjacent mines, the mouth of one property being about 1200 ft. away, so that we could see the smoke, flames and debris issue from the pit's mouth. As to the number of reports and the property in which the first explosion was heard, we three eye-witnesses differed radically in our opinions. From the pit mouth of that mine several seconds before it showed at No. 6 mine. Others said that smoke issued from No. 6 first, although the majority seemed to hold to the former opinion. The color of the smoke that issued from the mouth of the two mines, according to different witnesses, might have been anything from reddish brown or black to the light color of steam.

The Runaway Trip

The examination resulted in showing that many witnesses saw the runaway cars dash back into the slope. The greatest difference of opinion concerns the time that elapsed after the cars disappeared until the explosion occurred and the smoke was seen. The evidence here is as unsatisfactory and indefinite as it could possibly be. From the time the trip started down the slope until the smoke issued could have been from five or six seconds to one minute, according to the testimony of the different witnesses. One witness, a blacksmith by the name of Jenkins, was shoeing a horse when the trip passed by into the mine. He says that several seconds later the electric lights in his shop went out and then after about the same space of time the rumble of the explosion was heard. This evidence was corroborated by other witnesses and in no case contradicted.

A part of the evidence that seems very important and that received small attention was the statement that before Dec. 6 (the date of the explosion) two fires were caused by runaway trips that dashed into the mine and were wrecked at the foot of the slope. This evidence was given by Trader, the fire boss at No. 6.

WRECKAGE OF FAN AND POWER HOUSE AT MONONGAH NO. 8

With our senses expectant and alert, the majority might see and hear aright; however, it is the unexpected which cannot be repeated or prolonged that causes the confusion of ideas.

Summarizing the evidence submitted at the Monongah inquests, it is possible to review briefly as follows: The inquest was started Monday, Jan. 6, and the first two days were taken up with hearing the statements of eye witnesses, engineers and members of the rescue party. Some claimed that the explosion occurred in mine No. 8 first, because smoke issued

One witness said that there were signs of fire at the foot of No. 6 where the cars were wrecked. Several other witnesses claimed that indications of fire at this point could not be found. Electricians said that there was no evidence of fusion about the wires or indications of any short circuit.

The direction of travel of the explosion also remains in doubt, for some believe that it traveled from No. 6 to No. 8, while others were sure that it came into No. 6 from No. 8. Chief Inspector Paul and his assistants seem to have studied

this question carefully, and their report deserves thorough consideration.

Testimony of Company Officials

The last days of the inquest were devoted to the testimony of the company officials and the mine inspectors. The company experts disclaimed the theory that the runaway trip of cars had been a factor, and stated their belief that powder exploded in a crosscut in No. 8 mine and had thus started a series of explosions. Their evidence was based on the finding the men did not show marks of violence, is advanced to show that the destruction was accomplished by a series of explosions.

State Inspector's Theory

The cause of the disaster advanced by State Inspector Paul and some of his assistants is that a blown-out shot occurred in the third left entry off the second north in No. 8 mine, and that dust and gas were here ignited, causing the beginning of a series of explosions. State Inspector Larue, whose district comprises the Monongah mines, could not be shaken in his belief that the trip of runaway cars caused the disaster, and therefore did not indorse Chief Inspector Paul's report.

THE WRECKED FAN AT MONONGAH NO. 8

of two 5-lb. cans of powder between rooms Nos. 21 and 22 in the right entry off the first south face in mine No. 8.

The company's theory is that the exploding powder fired the dust, causing a terrific explosion, which burned the coal, distilling gas which afterward exploded and rushed onward driving the air before it. The second explosion generated more gas, which again found the proper proportion of air, and other explosions followed. The fact that in certain places the coal is burned and there are evidences of terrific heat, while in other sections the coal is scarcely burned and the bodies of

Facts Brought Out

Although the testimony was generally conflicting, there are some points of agreement. (1) The mines were properly planned; the ventilation was fairly good. (2) The mines were dry and dusty. (One witness stated that several local points were damp). (3) Gas was present but not in large quantities; the miners worked with naked lights. (4) Mining machines were largely used; miners were asked not to fire shots until 20 min. after a cut was made; each machine in making a cut produced about one carload of dust. (5) Some of the shooting was done carelessly; black powder was used; some shots were even fired from the solid. (6) Naked wires carrying 280 volts were placed underground. (7) The main entries were sprinkled at irregular intervals; but little dust was ever removed from the mines.

Points in Dispute

One prominent witness stated in answer to a question, that it was impracticable and unnecessary to sprinkle rooms. What foundation he had for such a belief I cannot surmise, for it is the accepted and approved practice at the better mines in this and foreign countries to sprinkle all rooms as well as entries and haulways.

The method of driving seven parallel headings in No. 8 mine, which was commended by Chief Inspector Harrison, of Ohio, was shown to have its advantages; with this system of development, a total of 175,000 cu.ft. of air could be circulated

throughout the mine at a velocity of 800 ft. per min., but with only two air courses, the intake and return, the air would be circulated with a velocity of more than 2600 ft., which would be dangerous and most impracticable. Inspector Harrison bases his objection to this large number of airways on the fact that the additional air-courses act as reservoirs for holding large quantities of dust that may afterward enter into an explosion. By removing dust at the face of all entries and rooms, which by the way is much safer than to sprinkle, it is possible that but little dust would accumulate in these parallel airways.

CLEARING AWAY THE DEBRIS AT MOUTH OF NO. 8 MINE

Conclusion

It seems unfortunate that in examining mines that have been the scenes of explosions, those who try to determine the cause generally find it necessary to ignore everything that has been taught by experience at previous accidents and discard former theories that are now accepted as facts. It is only of late years that we have begun to believe so firmly in dust explosions; in fact, the majority of anthracite engineers and superintendents do not now place much faith in the dust danger, because their chief enemy is gas.

The Monongah explosion was a dust explosion aided by small quantities of gas that probably were present. There is no doubt from the condition of the mine after the disaster that it acted as all dust explosions have done heretofore; that is, a series of explosions, one succeeding another, gathered in force and destructive power as it traveled along. This theory is proved by the fact, as stated in the evidence, that some parts of both mines were completely destroyed and the men literally blown to pieces, while at other localities the men were not so seriously mutilated and the forces of destruction were less.

I believe firmly that the runaway trip was the direct cause of the explosion, and not a coincidence, which might happen once in a generation. In my general review of coal mining, in the Jan. 5 issue of the JOURNAL, I called attention to a phenomenon or rather an interesting occurrence observed by an English engineer. This authority stated that the dust raised by an ordinary trip of cars, running along a gangway in the usual manner, was, on a certain occasion, ignited by a charred piece of wick knocked from a miner's open light. The flame from the burning dust followed the trip some little distance, and when the cars were stopped, the flame went to the roof and returned over the same course, dying out at the initial point.

Not one of the experts has attempted to explain why, if the explosion occurred at the face or in the interior of either mine, it did not destroy the mouth of No. 6, which is shown in one of the accompanying illustrations. As to the time of the explosion with reference to the runaway trip of cars, I believe the force of the explosion would have prevented the cars from reaching the bottom of the slope if the explosion had occurred a few seconds before the cars were wrecked; if the explosion had occurred just after the trip had reached the bottom of the slope, much debris from the interior of the mine would have been piled up against the wrecked cars.

The explosion might have caused six or eight blown-out shots if there were that many miners just prepared to fire their holes at the time of the disaster; likewise, many 5-lb. cans of powder could

have been exploded by the concussion and the flame.

The only doubt in my mind as to the runaway trip theory is raised by a part of Inspector Paul's report. In his examination, Inspector Paul said: "The post which supported the door separating the two mines was found standing in such a position that no force could have thrown it toward No. 6 without breaking it, while the least force exerted would have thrown it toward No. 8 mine. This evidence we deem conclusive that the force of the explosion traveled from No. 8 mine into No. 6 mine." If the explosion traveled first from No. 8 to No. 6 mine then the point of origin was surely not at the bottom of the slope in No. 6, in which case the runaway trip would have been either an extraordinary coincidence or an attributory cause.

There are, however, some points to be considered in this connection: The evidence submitted by several witnesses showed that at some points the explosion traveled in both directions. This is perfectly natural and in accord with the general theory that there were a number of explosions, one succeeding the other. If the explosion did travel from No. 6 to No. 8 and after passing through the door separating the two mines, another explosion or one of the series could have occurred, it would have caused a rebound of such force that the appearances would have indicated the direction of the explosion as coming from No. 8 mine. It is probable that from the center of each one of the series of explosions, the forces extended in both directions, although the general direction of the disaster would have continued on into new ground and finally out of the mine to daylight.

STOPPING UP THE ENTRANCE TO NO. 8, IN ORDER TO RESTORE VENTILATION

Many Problems Unsolved

The positions of the three men in the tool shanty near the foot of the slope seem to indicate that they had made not the slightest movement to save themselves. One of the physicians testified that these men might have been killed by the concussion. The field for enlightenment along medical lines in connection with explosions is wonderfully large, and it is to be hoped that the Government in its attempt to solve our problems will not overlook this side of the question.

The field of investigation as to the causes and attendant results of mine explosions has hardly been entered, and those who were at first skeptical have been compelled, by the great losses of life and property, to revise their opinions, and at least to give thought to many modern theories, such as the influence of barometric pressure, and seismic disturbances; also to give attention to improved methods, the entire removal of dust and firing shots electrically.

A good method of keeping water off the haulways of a mine is to carry the accumulated water, by means of a system of pipes from the roads into the back airways; one drainage airway should be provided for each heading. Where this method is used no water of consequence need be found on the haulways.

It is estimated that New Zealand has an available coal supply of 1,200,000,000 tons, of which not more than 20,000,000 tons have been touched. This was the first of the British colonies to try the experiment of state ownership of colliery property.

Report on the Monongah Mine Explosion

By Geo. Harrison*

After carefully examining the Monongah No. 6 and No. 8 mines near Fairmont, W. Va., where the recent disastrous explosion occurred, we found that both mines were indisputably equipped with modern fans and machinery capable of producing more than double the amount of air current necessary to make all parts of the workings perfectly safe from a standpoint of ventilation. On account of the general destruction, the accumulation of wreckage and falls of roof, it was, however, impossible to decide whether on the day of the explosion, and prior to that, the ventilating current was properly conducted and distributed through the inner chambers of the mines and the old abandoned workings where the elements of greatest danger are usually lurking.

In a number of instances we noted that working places, both rooms and headings, especially in No. 8 mine, were driven long distances beyond what is known as the 80-ft. limit between the breakthroughs. We understood also that the mines were not in operation the day previous to the explosion.

It is reasonable to assume that in the quiet of the mine, especially if the barometer was low and weather conditions favorable, gas would generate and ascend to the highest and most favorable points, and would remain there until disturbed by the action of moving bodies and diluted by a mixture of common air.

The Runaway Trip

About the time of the explosion, it is said, a trip of 15 loaded mine cars, liberated by the breaking of an iron coupling pin, ran back 1200 ft. on an 8 per cent. down grade, and wrecked at the bottom of the No. 6 slope, tearing down the electric wires and causing a short circuit, instantly throwing out the circuit breaker.

We made a very close inspection of this wrecked trip, and of its surroundings, and failed to find any evidences of fire or of any justification for the belief that the explosion originated at that point, or by contact of the electric wires. Had the explosion started there, this would have been demonstrated by wreckage at the outer end of the No. 6 slope, which is near the mouth of the opening, and by far the point of least resistance. There was no evidence of force between the outer end of the wrecked trip and the mouth of the slope; three men were found dead in a tool shanty close to the outer end of the wreck, bearing no marks of violence.

If the runaway trip occurred just previous to the explosion, which seems to be the general statement of those present, then we have no hesitation in saying that it may have played an important part in making the explosion possible. It can well be imagined how 15 loaded cars, weighing four or five tons each, running uncontrolled 1200 ft. down an 8 per cent. grade into a mine opening which was the inlet of air, would cause such an extremely abnormal force as to raise the dust in the air and dislodge the latent gases in the most remote parts of the old workings in all sections of the mine, and drive these elements of danger on the open lamps of the miners in their working places. It is evident, too, from the report on the fire bosses' bulletin board at the mouth of No. 6 mine that traces of gas were found in several places on the morning of the explosion, but during our whole investigation we found very few traces of gas in either mine.

If the runaway trip and the explosion were simultaneous, the wreck almost blocking the No. 6 opening might have prevented the destruction of the main opening, but as at No. 8 mine, the force of the explosion could have found relief in the destruction of the return airway and the No. 6 fan, which remained intact, only slightly disarranging the fan house by the concussion. Remembering that there is a gradual rise of the coal seam from the No. 6 to No. 8 mine, and that the elevation at No. 8 mine is 50 ft. higher than that at No. 6, it is but natural to assume that any light gases and fine dust distributed by heavy falls of roof or high-speed haulage systems would drift in the direction of No. 8 workings and lodge at the highest available points in every part of the mine.

The interior of each mine is reached and developed by seven parallel main headings running west, the distance between the two sets of headings being about 4000 ft; the connection between the two mines is made by three parallel north and south headings. The connection is said to have been closed by stoppings and doors, each mine having an independent system of ventilation.

Although every person in No. 6 mine was also lost, the destructiveness of the explosion is much more apparent in No. 8 than in No. 6 mine, the greatest force coming from the inner workings and leading outward, increasing in force and volume as it swept the dust-laden headings leading to the No. 8 opening.

We noticed many evidences of great want of skill or practical experience in the locating and drilling of holes, as well as the want of judgment in the use of blasting powder; in two particular instances blown-out shots were found where all the surroundings would justify the opinion that an explosion had taken place at both points. At a point known as No. 1 right air course to the main west heading; in the face of this entry a 7-ft. cut was made in the coal and one blast had been fired, the hole having been drilled high and pointing upward. The blast had blown off a portion of the coal, leaving 2 ft. of the hole and failing to break down the coal which it was intended to remove. The coal from the blast was thrown back a distance of 25 or 30 ft., and the coal was charred; much dust was in evidence around the face of the heading, as if an explosion had taken place. There was an entire absence of any sign of any one having been in the place after the blast. The miners' tools were lying in the breakthrough leading to the parallel heading about 25 ft. back, just as if they had been placed there by some one for safety while firing the blast. The heavy iron track rails, with parting through the breakthrough, were twisted and torn and thrown outward for 12 or 14 ft., and the body of the miner, who had evidently been in the breakthrough, waiting for the blast, was scattered around in the breakthrough to the parallel entry and outside of the breakthrough in a dozen or more pieces. An exploring party a week before found the body of a man in the face of the parallel heading 25 ft. inside of the breakthrough; he had been shielded from the force but died from concussion or afterdamp. All indications were that the force was outward from the face of the heading where the blast had taken place.

Another blown-out shot had occurred in room 31 of the second right off first south heading. The hole was drilled toward and bearing on the left rib of the room. The front of the coal was blown off, but 3 ft. 9 in. of the hole remained. The coal was somewhat charred on the side of the room near the outer end of the drill hole. The coal from the blast was slashed against the pillar opposite the neck of the room 22 ft. back, and coal on the pillar greatly charred, showing signs of fire from explosion. On the same heading at 27 room neck, a five-ton gathering motor and a number of empty cars were thrown across the track and piled up by the force of the explosion, which was strongly in an outward direction. The motor and cars, supposed to have been going in at the time, undoubtedly met the force of this explosion.

The above are only two out of a number of instances showing that blown-out shots are of rather a common occurrence, and that life and property are always in danger under such conditions and circumstances. There will no doubt be many theories as to the causes of the explosion, all more or less sustained by facts. None are left to tell the tale or to give any reliable information as to the conditions of the mines or defects of the ventilation in the inner working places, or the dangers that existed on the morning of the explosion resulting from roof falls or other causes during the previous day when all work in the mine was suspended. It is

*Chief inspector of mines, Columbus, Ohio. In making this report Mr. Harrison was assisted by inspectors Jones, Turner and Miller, of Ohio.

more than doubtful if ever the real cause will be known.

It is our opinion that the explosion may have occurred in either mine, and could have been caused by a miner's lamp coming in contact with gas, or by a blown-out shot raising and igniting the dust, but the effect of the greatest force is most visible at the head of the principal heading on the No. 6 side. At a point near the connection of the two mines there had been a whirlwind of force and destruction. A division of the force is evident, going both towards No. 6 and No. 8 territory, increasing in volume by a series of new explosions or reinforcements and spreading destruction in every part of the mine, where its force was diminished by the presence of water or the absence of coal dust.

Whatever may be the conclusions of theorists and experts, suffice it to say that these explosions cannot occur except where there is an accumulation of destructive elements and a favorable opportunity for setting them in motion. In olden times such awful catastrophes were looked upon as a manifestation of the vengeance of a Supreme Power; and some people even at this day say they are unavoidable. It is impossible for such things to occur if a proper knowledge of the accumulating dangers is utilized by those in authority to steer clear of the fatal combination of conditions.

We feel that the sacrifice of over 600 lives by mine explosions in Pennsylvania, West Virginia and Alabama, during the month of December, 1907, ought to stir the moral sensibilities and teach a never-to-be-forgotten lesson to those connected with mines, prompting every possible precaution against future calamities. We are not disposed to criticise, and particularly not in an unfriendly way, but we are not clear as to the advantages to be derived from the system of driving seven parallel main headings. In the Monongah case they acted as storage chambers for mine dust, which we consider to be of the greatest sources of danger at those mines. The great evil of connecting mining properties is also forcibly presented in this case by doubling the number of the dead. In the annual report issued by this department in 1904, we wrote a rather strong comment upon the dangers and evils incident to the connecting of mining properties, and closed with the following paragraph:

"We fear that if there is not some check in this direction, and more care exercised about the connection of mining properties, that the time is not far distant when the subject will be presented to the people in such a serious aspect that a prohibitory law will be enacted."

The deepest borehole put down for coal in Great Britain was completed during 1907 at Cameron Bridge, Fifeshire. It attained a depth of 4534 ft.

Colliery Notes

The excessive use of timber in an airway should be avoided as it reduces the area of the cross-section and increases the friction and results in a loss of efficiency in the ventilating apparatus. Timber used in the intake lasts longer than similar timber used in the return.

One of the advantages arising from "working on end," is that the line of face crosses the slips, where the roof is tender, and that since the slips continue into the overlying strata, there is less danger of a fall of roof when the undercut coal is taken down than would be the case if the line of face were parallel to the slips.

According to the council of the Conference of South Russia Coal Operators the output of soft coal in southern Russia in 1906 was 14,154,120 short tons, against 12,614,580 in 1905, the output for 1906 being the largest on record. The manufacture of coke, used almost exclusively by metallurgical plants, attained only 1,678,140 short tons, against 1,855,440 tons in 1905. The number of employees used to produce all this fuel was 87,063 against 83,383 in 1905.

It is estimated that there is no less than 62,000 sq.m. of coal-bearing country in the eastern States of Australia. The probable quantity of the available coal is estimated at not less than 240,448,053,000 tons. In Victoria, there are beds of tertiary coal over 260 ft. thick. The coal of New South Wales is estimated at 115,346,660,000 tons; that of Queensland at 83,310,000,000 tons; that of Victoria at 32,388,213,440 tons; that of Tasmania at 8,363,520,000 tons; that of West Australia at 1,045,440,000 tons.

Water used as a lubricant has given good results where the pressure between the surfaces is not great, as in the vertical cylinders of some steam engines, where the piston has no bearing against the cylinder walls, but is held in the bore by piston rings which alone rub against the cylinder. In the interior of cylinders thus run, a thin, hard skin, called "water polish" forms on the sliding surfaces, making them smooth. If the engine stands unused for a short time, however, this affords no protection as the polished surfaces rust rapidly.

A good cylinder oil should combine the following qualifications: It must possess sufficient thickness to keep the surfaces from rubbing under pressure. It must be as liquid as is consistent with the conditions of pressure; it must be able to resist the action of the atmosphere; it must not corrode the surfaces upon which it is used; it must have a high point of decomposition under heat. Mineral oil is the best inasmuch as it possesses the above qualities to a higher degree than other oils. Vegetable and animal oils are unfit for cylinder use as they decompose easily and quickly in a warm moist atmosphere.

If wire rope used for underground haulage is properly taken care of its life may be greatly prolonged. Such rope should touch the ground as little as possible when running. The entire length of rope should be kept lubricated and never allowed to wear "shiny." A brush should be used in applying the grease, as the lubricant penetrates between the wires more easily when thus applied. Sudden jerks should be avoided and the ropes kept taut while running so as to avoid kinks or twists. The rope should be reversed occasionally so as evenly to distribute the wear. Friction can be reduced by the use of large sheaves; for the same reason return wheels and curve drums should be made as large as practicable.

The three things to be considered when about to install a mine fan are: (1) the cost; (2) efficiency; (3) maintenance, cost of repairs and labor, also the ability of the machine to stand the daily strain. If the area to be ventilated is small and calls for but little ventilation, or if the field is new and final conditions cannot be taken into account at the time of installation, an expensive fan should not be installed, but a cheap machine can be economically used, until such time as final judgment can be formed. For a final installation, only a high-grade fan should be considered. It has been estimated that one mine-boiler horse-power is worth $50 per year; therefore, the saving per year in the consumption of steam possible with a high-grade fan is an important item.

It pays to wash coal. If a coal containing 10 per cent. removable ash is used without washing, a plant 1/10 larger than would be necessary with washed coal must be maintained. If unwashed coal is used under a boiler, the removable dirt, sulphur, iron, etc., may become fused on the grate bars and seriously interfere with the passage of air and thus cause imperfect combustion, and burning out of the bars. To the cost of removing the ash and replacing the bars, must be added the cost of the extra amount of coal burned under such grate conditions. The cost of transporting dirty coal is an item not to be overlooked. If a coal has 20 per cent. ash, at least 15 per cent. of this undesirable element can probably be eliminated by washing. Therefore, why should the consumer pay for transporting a useless product, which might have been disposed of by washing at the mine at a cost of not more than from 4 to 8c. a ton. The cost of washing and shrinkage is amply covered by the saving in transportation charges. Washing also often solves the problem of the disposal of the slack pile, and renders marketable much small coal that would otherwise be left in the mine.

Metallics

Commercial bromo-cyanide contains about 40 to 44 per cent. bromine as bromide and 20 to 22 per cent. bromine as bromate.

The cost of fine-grinding the sands from a Goldfield ore in a 4x16-ft. tube-mill, fitted with silex lining, according to Edgar A. Collins, is approximately 70c. per ton of sand re-ground.

The wall rock of the veins at Cripple Creek is usually strong except where dikes cut it. Where the country has been shattered and broken by these dikes, the ground is likely to slab off badly and therefore requires close timbering.

At the Great Boulder Perseverance mill, West Australia, the loss of finely-divided sludge, which results while cleaning the zinc boxes, is obviated by placing wood shavings in the end compartment of each zinc-box. These shavings catch the sludge; they are incinerated from time to time and the ashes added to the other sludge.

There are many forms of leasing. Sometimes leasing companies, as strong financially as many mining companies, are organized to work blocks of ground in a mine or even to re-open abandoned mines. At other times the lessee is so poor that all he can furnish is the labor. In such cases a royalty as great as 50 per cent. is sometimes charged.

The large companies at Butte, Mont., favor steel headframes and the old wooden headframes are gradually disappearing. At Butte these headframes consist of latticed members forming an A-shaped frame-work. The appearance of these headframes is in striking contrast to that of the more complicated headframes used on the Rand, South Africa.

Ore is metalliferous rock, which pays a profit when mined. The cost of mining and treatment is, therefore, almost as important as the gold content. At the Portland mine, Cripple Creek, Colorado, rock assaying less than $5 per ton was formerly sorted out as waste, but the application of the cyanide process to Cripple Creek ores has converted such rock into ore.

Timbering is always to be considered as a temporary support to ground. Waste filling must be used subsequently to secure all stopes where mining progresses on a large scale. Otherwise, although the stopes may stand for years, they are sure, when mining becomes extensive, to finally cave, causing much difficulty in mining when such a large mass of ground gets to moving.

When ore is high-grade and occurs in narrow veins, the value of the broken ore, necessarily tied up in the stopes when a method of ore-filled stopes is used in mining the ore, often causes the adoption of the open-stope, stull-timbering method of mining. This latter costs more than the former, but when the ore is high-grade the interest on the gold obtained more than makes up for the difference in cost.

When a mine is worked by the leasing system, the superintendent of the mine should have much first-hand knowledge of underground work. It requires careful watching to guard the interest of the company, as the lessees are inclined to avoid any work, such as timbering, which is not absolutely required to render the mine safe while they are working it. The lessees watch today, the mining company must bear in mind the morrow.

At most large mines electric push-buttons are used in shaft signaling. These are used when hoisting ore, etc., as they are quicker and easier to operate than the old bell rope. Nevertheless, not only as an accessory to be used in case of damage to the electric signals are bell ropes retained, but the bell rope is also required for signaling from the cage while inspecting or repairing the shaft and in case of accident while men are being hoisted or lowered.

Bromo-cyanidation has been most highly developed in Australia. By fine-grinding and using bromo-cyanide for solvent, it is often possible to treat more cheaply a sulphide or telluride ore carrying gold than by roasting it and then cyaniding. At the Hannan's Star mine the cost of bromo-cyanidation was 9.75d. or about 19.5c. per ton of ore treated. The bromo-cyanide process requires closer attention than when potassium or sodium cyanide is used alone.

In sinking a shaft in ground having a tendency to swell, it is well to place the shaft perpendicular in length to the strike of the stratification or laminations. The reason for this is that the swelling is due mainly to the oxidation of certain minerals in the rock. As the minerals are liable to be concentrated in bands or layers, parallel to the stratification in sediments and to the laminations in schists, the tendency in the rock is to slab off in layers parallel to the strike. Therefore, if the shorter dimension is placed parallel to the strike, the pressure from the swelling will be a minimum.

In sampling rich ore the quartering should be done on plate-glass. This removes the danger of salting the sample with small particles adhering from a previous quartering of the ore. In an assay office there should be two bucking-boards, one for grinding rich ore, the other for poor ore; thus the danger of salting the poor samples is greatly diminished. When a small gyratory crusher or a disk grinder is used for preliminary grinding, a supply of barren rock should be kept handy and a small quantity of the rock ground in these to clean them after grinding each sample.

Ladders in Western mines are made with legs of 2x4-in. timber and rungs of 3x1-in. pieces. These rungs fit into notches cut in the legs and spaced with 10 or 12-in. centers; the latter distance is the more common. A handy way of making such rungs is to saw pieces, from a 3-in. plank, the correct length of the rungs. Then these pieces can be easily ripped on the wedge saw if a cleat is nailed an inch from the saw to act as a guide when ripping the piece. Such rungs with the layers of the grain across the width are stronger, for they are less apt to break when a rock falls on them than when the layers are parallel with the width.

The three simple appliances for hoisting are the hand-windlass, the whip and the whim. Many people are inclined to think that these hoisting arrangements are crude. It is good engineering to use a windlass in sinking prospecting shafts to a depth of 100 ft. It is even good policy to use a windlass when only a small amount of rich ore is to be hoisted from that depth. With greater depth it is well to use a whip or a whim. A whim is to be preferred. With a horse-whim, hoisting can be done economically from as great a depth as 300 ft. At greater depths or when the tonnage to be hoisted becomes large, a steam, electric, or gasolene hoist should be used.

Throughout the West there is much variation in different camps in the use of hoisting rope. Butte, Mont., is characterized by flat cables, as is also Virginia City, Nev. In Tonopah, Nev., some of the hoists are equipped with flat cables, others with round cables. At Cripple Creek there has been recently some tendency to use flat cables instead of round cables. The use of flat cables is confined to large camps, probably owing to the fact that the necessity of keeping on hand a rope gang, to repair the flat rope, will not pay on small mines. On the Rand, South Africa, flat ropes are in ill repute on account of accidents, which have been caused by their breaking.

It is unfortunate for a company to have to hoist barren rock to the surface. Development work should be so planned that the waste rock can be used nearby for filling. But sometimes it is necessary to hoist such rock to surface. There should, therefore, be two rock dumps, one for absolutely barren rock and the other for rock containing sufficient mineral to suggest the possibility of future profitable treatment. Much ore is now mixed with a mass of waste in the old dumps of such districts as the Comstock. It could have easily been kept separate then as could mineral-bearing rock that is now being dumped with barren rock. The Comstocker was as sure that such rock would never become ore as is the present mine superintendent that his mineral-bearing waste rock will never become ore.

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Contents

PAGE

Editorials:
The Prevention of Colliery Disasters 267
John B. F. Herreshoff 267
The World's Production of Spelter in 1907 268
The Royal School of Mines Dinner 268
The Canadian Mining Institute 268
*Montezuma Mining District, Colorado. *Etienne A. Ritter* 241
Richmond-Eureka Mining Company 245
Vanadium Deposit at Magdalena, New Mexico. *A. Lawrence Heister* 246
Treatment Problem of the Republic (Wash.) Gold Ores. *Fritz Cirkel* 246
Anthracite Coal Shipments in 1907 247
The London Tin Market in 1907. *Special Correspondence* 248
*Operations of El Oro Mining and Railway Co. 249
*The Robinson Non-Slagging Tuyere 251
Recent Developments in Clifton-Morenci District, Arizona. *A. W. Hixson* 251
*Method of Handling Matte at Selby, California. *James C. Bennett* 252
Extension of European Coalfields 254
Some Characteristics of Natural Graphite. *Frederic S. Hyde* 255
Gold Movement in Great Britain in 1907 256
The Boston Consolidated Mining Company 257
Pittsburg's Speculation in Mines 258
The Larder Lake District, Ontario *R. W. Brock* 258
*Inquiries Into Recent Mine Explosions. *Floyd W. Parsons* 259
Report on the Monongah Mine Explosion *George Harrison* 264
Colliery Notes 265
Metallics 266
Correspondence:
The Fire- and Wet-Assay of Silver Ores. *G. W. Kneisly* 269
Coal-dust Firing of Reverberatory Furnaces. *E. G. Thomas* 269
The Forest Reserve and the Mining Laws. *A. Lawrence Heister* 270
Freight Rates on Coal in Missouri. *L. L. R.* 270
The Explosion at Monongah Coal Mines. *Sydney F. Walker* 271
The Weaver District, Arizona. *H. A. Bomberger* 271
Peters' "Principles of Copper Smelting" and the Metric System. *C. Harpur* 271
Utah Copper Company 273
New Hope for the Comstock Mines. *Special Correspondence* 273
Special Correspondence 276
Mining News 278
Markets 284
Prices Current Chemicals, Minerals, Rare Earths, etc. 289
Dividends 290
The Mining Index 291

**Illustrated.*

The Prevention of Colliery Disasters

The loss of over 600 lives by colliery explosions in Pennsylvania, West Virginia and Alabama in a single month—December of 1907—stirred the moral sensibilities of the people of the United States and aroused a demand that something be done to reduce the waste of life in coal mining in this country, which is shown by statistics to be greater than in other coal mining countries. It is good that public attention has been called so strongly to this disgraceful feature of our mining practice. It is necessary, however, to consider rationally the means for improving conditions. Much of the talk up to date has been irrational.

In continuance of the spirit of paternalism, which is increasingly pervading the minds of the American people, the general talk in the present case has been to appeal to the Federal government, and the cry has been "the Government must do something." This has been fostered by Government officials, who are anxious to increase the scope of their activities and opportunities for taking a hand in the industries of the country. The present sentiment among the people has been cleverly put forward as a reason for the creation of the proposed Bureau of Mines, which is now before Congress. For example, we have had such remarks as the following from a recent report of a well known mine inspector:

"Close observation and striking recent events justify a further prediction that if the general conditions of operating mines in the various States are not soon covered by adequate Federal laws, the sacrifice of human life in the mines has merely just begun."

Now, as a matter of fact, the Federal government cannot constitutionally pass any law to ameliorate present conditions (except in the Territories, whereof New Mexico alone has an important coal mining industry) unless the constitution be amended; and the character of the requisite amendment would be such that the States would never consent to relinquish the powers that they would be obliged to do. Even in so far as concerns the inspection of mines for the scientific study of conditions, the Federal government is limited to the courtesy of the owners of the mines. Those who think that a bureau of mines would be a remedy for present evils would find themselves disappointed.

The conditions which exist in our collieries are woefully defective, and prompt action should be taken to improve them. This action should be taken, however, by the several States, which have not only the right to enact laws governing mining within their boundaries, but also the power to enforce them. The proper course to be taken is: (1) Each of the coal mining States immediately to enact a law creating an adequate department of mine inspection to enforce stringently the existing laws governing mining operations; and (2) to enact a law creating a commission to study coal mining conditions and draft new laws regulating operations which will embody the provisions for safety and general welfare that the latest scientific and engineering investigation have shown to be necessary. It would be desirable if all of the important coal mining States should unite in the creation of a single commission for the purpose of preparing a uniform law to be subsequently adopted by each of the States. This would be a prompt and practicable way to secure such remedies as are necessary to reduce the frightful loss of life that the United States has been suffering in its production of coal.

John B. F. Herreshoff

The award to John B. F. Herreshoff of the first Perkin medal for achievements in applied chemistry by the New York section of the Society of Chemical Industry is a well-merited honor. The Perkin medal was established a little more than a year ago on the occasion of the visit to this country of Sir William Henry Perkin, whose discovery of mauve was the beginning of the coal-tar product industry. It is awarded annually by a committee of the Society of Chemical Industry, American Chemical Society and American Electrochemical Society, and represents the recognition of valuable work in the field of applied chemistry.

Among chemical engineers, Mr. Herreshoff stands eminently. During his long connection with the Nichols Chemical Company, General Chemical Company and Nichols Copper Company his practical achievements in the perfection of both the chamber and contact processes of sulphuric acid manufacture and the elaboration of many chemi-

cal processes have been distinguished and valuable. In that branch of chemistry which we call metallurgy his accomplishments have been even more brilliant. He was one of the earliest of metallurgists to apply scientific knowledge and engineering invention to the art of copper smelting and 25 years ago introduced a successful type of water-jacket furnace in connection with which was employed an ingenious forehearth that for certain conditions was a much more perfect device than anything previously known.

Mr. Herreshoff, however, became most widely known by his highly successful roasting furnace, in which he redesigned the old McDougall furnace, previously discarded as a failure, so that it would work, and thus created the type of what are now called McDougall furnaces, the most extensively used of all furnaces in the roasting of pyrites both for acid manufacture and as a preliminary to copper smelting. The basic idea was McDougall's, but the practical ideas were Herreshoff's.

In electrometallurgy Mr. Herreshoff has also had great opportunities as the technical head of the Nichols Copper Company. His improvemens in this field have not been given to the world, but his works has become the largest electrolytic copper refinery of the world and contains unique features.

It is fitting that these important achievements should receive the recognition that has been given by the three great chemical societies of the United States.

The World's Production of Spelter sn 1907

Henry R. Merton & Co., of London, have issued with their usual promptness the annual summary of the production of spelter in Europe, Australia and the United States. It is a remarkable example of good statistical work that a statement of the World's production of this metal is made available so early as Jan. 17, which is the date of the document.

It appears that the world's production of spelter in 1907 was 726,435 long tons, the remarkable annual increase which has been going on uninterruptedly since 1899 having thus been maintained in 1907. The details of the statistics are given in the following table:

PRODUCTION OF SPELTER.
(Tons of 2240 lb.)

	1905.	1906.	1907.
Belgium	143,300	150,060	152,060
Rhine District	66,185	67,615	69,160
Holland	13,550	14,420	14,755
Great Britain	50,125	51,760	54,720
France and Spain	59,575	52,940	54,855
Silesia	127,895	134,180	136,260
Austria and Italy	9,210	10,610	11,180
Poland	7,520	9,460	(a) 9,200
Total Europe	467,360	491,045	502,190
Australia	.....	1,010	980
United States	180,360	196,245	223,265
Total world	647,720	688,300	726,435

(a) Estimated.

A remarkable feature in the above statistics is the fact that the increased production in 1907 came chiefly from the United States, the European countries showing only trifling gains. It is most noteworthy, however, that in 1907 the United States for the first time in history took the premier position among the world's producers of spelter, its production having been 223,265 long tons, against 205,420 long tons as the combined production of the two German districts, viz., Silesia and the Rhine. Giving the United States credit for the zinc content of its production of oxide made directly from ores, it has held the first place for a long time. Now it occupies the first place on the basis of spelter production alone.

The Royal School of Mines Dinner

For a number of years past it has been the custom to invite some distinguished graduate of the Royal School of Mines to preside at the annual dinner in London. This year the dinner will take place on March 18, and it may almost be said that it will assume the character of an international occasion, since the chairman will be Richard Pearce, who is even better known on this side of the water than in his native country. A Cornishman by birth and descent, and a graduate of the Royal School of Mines, much of his active life has been spent in this country. His successful work at the Argo works near Denver, and elsewhere in Colorado, and his high standing as an engineer have been recognized by his election to the presidency of the American Institute of Mining Engineers in 1889, and by other honors; and few men have been more generally esteemed by the profession.

Mr. Pearce recently left Denver and returned to England, but we are sure that the change of residence will not weaken his interest in Colorado, nor deprive our younger engineers of his advice and assistance upon occasion.

The Canadian Mining Institute

The organization of a Western branch of the Canadian Mining Institute is the second attempt made in that direction. The first was practically a failure; but the present is under better direction and better timed, and so has prospects of success. The need of such a branch is found in the great distance which separates the mining interests of Ontario, Quebec and Nova Scotia from those of British Columbia and Alberta, and makes it difficult or impossible for mining men from the West to attend the meetings of the institute. An active Western branch will be able to secure better representation for the Western interests in the institute, which in Canada is a semi-official body of considerable influence, as well as a technical association.

IT IS AN ILL wind that blows no one some good. This is the time of corporation annual meetings, and the directors of many concerns are telling their stockholders how disappointed they are at not being able to pay any dividend, but of course the great fall in the prices for the metals, etc. Some of these companies could never pay unless copper were continuously above 20c., lead above 5c., spelter above 5½c., and so on, and many made no production, wherefore the market conditions had no direct bearing; but the guileless stockholder in his short-memoried innocence forgets that the *débâcle* came not until nearly the end of the year, that after all the average prices for the 12 months were high all around; and the wily promoter gains a breathing spell, sees his stocks keep their place on the "curb" and bides his time.

IT IS REPORTED from Kentucky that a seam of white coal has been discovered on a farm near Wrightsburg in McLean county. The despatch further states that the specimens of the mineral were secured and are being displayed by a minister of the gospel who has just returned from conducting revival services in the mountains. Kentucky is famous for its old rye, but we have always understood that the native inhabitants could properly assimilate large quantities without being particularly affected. Kentucky, however, is a State that will have its own way, so why not discover a seam of white coal?

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal, and Inquiries for Information

CORRESPONDENCE AND DISCUSSION

The Fire- and Wet-assay of Silver Ores

Owing to the volatility of silver the fire assay for all classes of argentiferous ores is considered slightly inaccurate, giving low results, due in the main to this cause and also to absorption by the cupel. Furman, in his "Manual of Assaying," gives tables showing the loss of gold and of silver, where known amounts have been assayed by both methods. These tests show that the average silver loss is greater by 0.04 per cent. in the crucible assay than in the scorification assay. R. W. Lodge, in "Notes on Assaying," shows a loss of from 0.99 to 4.97 per cent., due to the varying temperature of the muffle during cupellation. I was unable to find, in the text-books on assaying, any tables giving a comparison of the two methods of fire assay with Volhard's volumetric assay. Believing that an investigation of the subject would be of interest, the data given in the following table were compiled from work done in the laboratories of the University of Oklahoma.

The ores used for these experiments were taken from the collection of the department of geology. No. 1 sample was almost pure Colorado galena; No. 2, a representative quartz ore, carrying a small amount of pyrites; No. 3, a basic iron, not quite a true limonite, but containing about 35 per cent. iron; No. 4 was pure pyrite; No. 5, a combination of lead and iron sulphides from the Black Hills district; No. 6, a heavy quartz ore; No. 7, a free milling galena from the Hermosa district of Arizona, containing a small amount of malachite; No. 8, a heavy silicate grading into a jasper and carrying the silver as sylvanite; No. 9, common quartz ore; No. 10, an ore of the same class as No. 8. All of the ores carried some iron ranging from about 1 to 35 per cent. In preparing the ores for assay, each was ground to pass an 80-mesh sieve. After mixing thoroughly the samples were taken.

In the scorification and crucible assays the tables in Furman's manual were used to figure the charges and 0.1 and 0.5 a.t. was used in each assay. Duplicates were run and where the results varied more than 1 oz. per ton, new assays were made For the wet assay, Volhard's method of precipitating the silver from a nitric acid solution by means of a standardized solution of potassium-sulphocyanate was used. The solution was standardized against a known amount of silver nitrate and then checked against a known amount of silver foil which had been dissolved in nitric acid.

After weighing, the samples were digested for five hours in concentrated nitric acid, and then titrated. The volume of the solution and the amount of acid was the same in the various tests. The ores carried enough iron to supply the necessary indicator.

Both the scorification and crucible assays were made in a furnace heated with gasolene. The buttons were cupelled upon 2¼-in. cupels.

The results obtained by the different methods were as follows:

RESULTS OF THE ASSAYS.

Assay Number.	Scorification Oz. Per Ton.	Crucible, Oz. Per Ton.	Volumetric, Oz. Per Ton.
1	13.82	14.14	44.83
2	*nil*	1.35	9.688
3	1.408	3.34	2.422
4	19.22	20.57	8.477
5	9.54	8.82	25.431
6	29.885	29.89	32.091
7	31.485	32.67	32.37
8	646.428	671.494	363.54
9	1.932	2.736	9.688
10	441.22	468.328	261.912

These results seem to show that the wet method of assaying ores is, in 7 cases out of 10, inaccurate, and also that the scorification assay will, in most cases, give results a trifle lower than the crucible assay where a larger amount of ore is used. But the wet method of assaying ores for silver can be accomplished in 20 min. Results of later experiments showed that the ores which had been boiled in nitric acid for 10 min. gave results as accurate as those secured when the ores were digested for 24 hours.

The wet assay seems to offer a practical method for the field-assay of ores for silver by the prospector. The only apparatus needed is a bottle of nitric acid, several flasks and a standardized solution of potassium sulphocyanate, which can be introduced from a pipette.

G. W. KNEISLY.

University of Oklahoma,
Norman, Okla., Jan. 6, 1908.

[Experienced assayers will not join our correspondent in condemning the Volhard method upon the evidence submitted. Nitric acid can not be depended upon to dissolve all the silver in ores of all sorts and descriptions. Mr. Kneisly neglects to state whether or not he tested the residues from the nitric-acid solutions for silver, also the amount of ore taken and the number of check analyses made. For testing the accuracy of methods, 80-mesh pulp is too coarse to give close results on unknown ores, and even in commercial assaying it is customary to run more than two duplicate scorifications. It is hazardous to draw sweeping conclusions from a few results, especially when they agree no better than those submitted. Some years ago a smelting works assayer ran about 30 duplicate assays of five scorifications each every day for two months to determine the value of a sampling machine, and even then the results were not regarded as conclusive.—EDITOR.]

Coal-dust Firing of Reverberatory Furnaces

I wish to dissent from the conclusions reached in the last paragraph of the editorial in the JOURNAL of Jan. 11, in which it is stated that because of the recovery of heat by waste-heat boilers, and because of the deposition of ash, that coal-dust firing will not offer any advantage to large reverberatories with attached steam boilers. I believe the contrary to be the case.

Smelter managers who have waste-heat boilers are as anxious to secure a large smelting ratio per pound of coal as those whose gases go directly to the stack. Coal-dust firing will deliver to the reverberatory and to its attached boiler, more effective heat units to the pound of fuel than grate firing. Its combustion is far more perfect, no excess of air over the theoretical need be used and there is no loss of unburned carbon in the ash. The smelting of a pound of metal and the generation of a pound of steam can therefore be accomplished with less fuel and the saving is as important when boilers are attached as when not. There will also be effected the same saving in labor, the same increase in capacity and the same continuity of operation in the two cases and each of these factors will add to the economy of the reverberatory process.

In Mr. Sörensen's report of his experiments with dust firing at the Highland Boy smelter in 1905, he states that an increase in capacity over grate firing of 30 per cent. resulted with the use of 24 per cent. less coal. When the flues were clear at Cananea an increase in capacity and saving in fuel considerably greater than the above was indicated.

If grate firing is used and if the demand for steam is equal to the capacity of the waste-heat boilers, supplementary boilers must be kept under steam to supply the deficiency which will occur during barring down, when so much cold air enters as to reduce very greatly the steam product of the waste-heat boiler. With coal-dust firing there will be secured such continuity of operation as to render the above unnecessary.

Advantages of the Waste-heat Boiler

The application of a steam boiler to a reverberatory instead of adding difficulties due to the deposited ash, is actually the cure for these troubles. The ash from pulverized coal, when first formed, consists of light flocculent particles readily carried by the gases at a moderate velocity, and when deposited by the slowing down of the flue gases or at bends in the flue, will remain as separate particles for a considerable length of time, at least an hour or two, and if regularly removed through suitable clean-out doors or from collecting pockets, no clogging of the flue should occur. However, if allowed to remain exposed to such a temperature as is present in the flue of a reverberatory, these ashes will slowly agglomerate into a porous clinker of considerable strength. In the original flue at Cananea, which was quite long, there were three 90-deg. bends and it was at these points, which were wholly unprovided with clean-out doors, where the flues become clogged.

In order to prevent the formation of clinker it is only necessary to reduce the temperature of the gases below the clinkering temperature of the ash and the interposition of a steam boiler is the most practical means of so doing. It will rapidly absorb the heat of the gases and ash, and the latter remaining in its finely divided form will readily be carried over to the collecting flues. Where deposited at all, whether on the boiler tubes or at other points, it can readily be removed by a steam or air blast.

One of the most destructive influences to which the roof of a reverberatory is subjected is the variation in temperature caused by the entrance of cold air during barring down. With coal-dust firing there is practically no variation in furnace temperature and the roof will stand correspondingly better. At the time that coal-dust firing was installed the arch over the fire in the Cananea furnace, on which both the direct heat of the fire and the draft of cold air impinged directly, was in such a condition that immediate repairs were contemplated. After the application of pulverized fuel no further deterioration occurred and no repairs were made up to the time the smelter shut down.

Edward G. Thomas.

New York, Jan. 14, 1908.

The Forest Reserve and the Mining Laws

The forest reserve law is bearing the same fruit in New Mexico as it produced in other mining localities of the West and Southwest; employment at fair wages of a few commissioners in forest reserve work, good men in their way, but having at best but a superficial knowledge of the mining industry, its rights or requirements; next, a small army of range riders; an ever-increasing stream of white lumber and timbers downward from the mountain slopes to points on the railroads, and a steady stream of money pouring into the coffers at Washington. This is one side.

The effects upon mining are less pleasing: the necessary closing down of many mines and mills remote from coal supplies, owing to the advanced price of lumber, timber and fuel under forest reserve laws; the refusal by the government of the right of entry on veins, lodes, deposits and placers known by experienced miners and prospectors to be subject to entry in compliance with mining laws now in force; the mistake when right of entry on mineral lands is in dispute, of sending a man wholly and utterly incapable, with but little theory and no practice, to settle the difficulty; a marked decrease in the number of working mines; a serious thinning in the ranks of the prospector and mine developer; and a general and wide spread depression in mining and prospecting—this is the other side.

The right of entry on mineral-bearing veins, deposits and placers has no doubt been wrongfully denied by government officials in thousands of cases, such refusals being in flat contradiction of the laws under which prospecting and mining has flourished for so many years.

A Concrete Example

A case which came under my observation will serve as an example. In November, 1906, Mr. X located a placer claim in Big Rosa gulch in the San Mateo mountains near Rosedale, Socorro county, New Mexico. This placer is directly under the erosion and flow of the Baking Powder gold quartz mine known to contain free gold in paying quantities. Mr. X complied with all the requirements of the U. S. laws governing placer claims, including assessment work, surveying, monumenting and recording in the county records of Socorro. Some time in the spring of 1907 the Government asked for and received bids for the spruce and pine timber in Big Rosa gulch, which with the entire San Mateo range of mountains is on the forest reserve. When government employees went to work marking trees and allotting the timber to different saw mill companies, the timber on Mr. X's placer came under the government hammer.

Mr. X objected and produced his proofs of right of entry. This right was denied. Time was asked for development work which would prove Mr. X's right of entry; this was also denied. Finally a so-called mining expert was sent from Washington to decide the case. This young man was no better qualified to act in the matter than the average Digger Indian. Every expression touching mineralogy and geology disclosed his ignorance. He decided in favor of his master, the United States Government, and the timber is being swept from the mountain sides.

Objections to the Forest Reserve Law

The forest reserve will prove a disappointment to the Government and an outrage to the mountaineer, miner, prospector and home builder of the West and Southwest. It cannot be denied that in isolated cases, lode and placer claims have been located for the timber only, and after sale of the timber the claims have been abandoned. But such cases prove the exception, not the rule, and such practices are always discountenanced by the great majority of miners and prospectors.

The attempt of the Government to rectify this evil by means of the forest reserve laws as at present administered, is in my opinion equivalent to removing a small boil, and grafting in its place a malignant cancer.

A few ojections to the forest reserve law are as follows: (1) It does not reserve. (2) It benefits a few hundreds and injures many thousands. (3) It retards the mining industry, and the development of the West and Southwest. (4) It conflicts with the mining laws under which the prospector and miner opened the territory to the world.

In conclusion, I wish to say that no blame attaches to any official or employee of the Government. The trouble is higher up and will never be settled until it is settled "right."

A. Lawrence Heister.

Magdalena, N. M., Jan. 5, 1908.

Freight Rates on Coal in Missouri

While in Missouri recently I found a curious condition of affairs as regards freight rates on coal. The Missouri State Board of Railroad and Warehouse Commissioners had issued an order establishing the coal tariff on a purely mileage basis by virtue of whoch the railroad rate on coal from the Illinois mines was reduced from $1.80 to 95c. per ton. The endeavor was made to favor the Missouri mines by putting them on a pure mileage basis, but the order was soon rescinded and is still held in abeyance, as it was found that the Illinois coals, of better quality, mined cheaply from thick seams, could cross the State of Missouri from the Springfield, Ill., district on a through rate of $1.25 to the Missouri river.

Missouri coals, mined from comparatively thin seams, and of only fair quality have always suffered from the competition of the thick seam coal, mined in southern and central Illinois. These coals are usually of better quality than the average Missouri coals, and, as a rule, better prepared, and the Illinois operator usually dumps his surplus on Missouri markets. Moveover Kansas coal has also been a strong competitor of the Missouri coal in the chief markets, viz.: Kansas City and Omaha. The instance cited shows the futility of any one State trying to legislate on such matters.

This action of the Missouri State Board of Warehouse and Railroad Commissioners has attracted the attention of coal men and miners and has been protested against. It is, as a consequence, held in abeyance. L. L. R.

Philadelphia, Penn., Jan. 4, 1908.

The Explosion at Monongah Coal Mines

In the report of the explosion at Nos. 6 and 8 Monongah coal mines, by Floyd W. Parsons, in the JOURNAL of Dec. 14, it is suggested that the initial ignition of coal dust was caused by an electric current. I take it that the No. 6 mine, in which ignition is supposed to have taken place, was worked by electric locomotives, in the usual way, the locomotives taking their current from overhead trolley wires, and the rails being used as the return conductors, the pressure being 280 volts. When the trip of cars ran back down the slope, it is supposed that it dislodged the insulators supporting the trolley wire itself to the ground. If this was so, a pressure of 280 volts would be present between any portion of the trolley wire lying on the ground, or near the ground, and any portion of the rails in the neighborhood.

Supposing that the trolley wire was broken, at the same time as its insulator was dislodged, the following would probably happen; the wire would fall upon the rail, and would then spring away a short distance; when the wire touched the rail, a short circuit would be formed, and when it sprang away a spark would pass between the wire and the rail, and as the pressure was still present in the wire, an arc would be pulled out, just as in an arc lamp. The action would be, in fact, exactly the same as that which takes place when an arc lamp is switched on. Under those conditions a pressure of 280 volts would maintain an arc 1 in. long, or even more.

ACTION OF THE DUST

It is stated in Mr. Parson's report that the mine roads were very thickly coated with coal dust. The runaway cars would probably stir up a certain portion of the coal dust, and the intense heat produced by the arc formed between the trolley wire and the rails would be more than sufficient to ignite any coal dust present within at least some inches, while probably there would be a considerable quantity actually in the arc itself. The sequence would follow the usual course of all explosions, as I understand them. Immediately the arc was formed, a certain portion of the coal dust would be burned, and a sufficient quantity of heat would be liberated by the burning coal dust to ignite further portions of coal dust beyond, and at the same time a certain quantity of hot gases would be formed. The combined action would tend to raise the coal dust in more or less of a cloud, which would facilitate its further combustion, the further and more rapid generation of hot gases, the very rapid expansion of the gases as they were formed, and of the air in the neighborhood, and all the attendant results we know as explosion.

The passage of the explosive wave into the No. 8 mine, and its disastrous effects there, will probably be, as Mr. Parsons explained, due to the resistance the explosive wave met with in that direction. The explosive wave would pass outward in both directions from the point where ignition first took place, and in the case of the No. 6 slope, would blow out the cloud of coal dust and smoke, as was seen, comparatively harmlessly, but in its passages in the opposite direction it would meet with resistance, which would cause compression of the gases, and of the air in front, this leading to further generation of heat, perhaps fresh explosions, and so on.

I should mention that if an arc was formed between the trolley wire and the rails, it would leave evidence in the trolley wire and possibly in the rails to which it sparked. The end of a metallic conductor, from which a spark has passed, is always fused, and nearly always in the form of a button. Anyone who has once seen the end of a conductor, from which a spark has passed, could not mistake it.

SYDNEY F. WALKER.

Bath, England, Dec. 24, 1907.

The Weaver District, Arizona

In the JOURNAL of Jan. 25 an article by J. E. Russell, of Prescott, Arizona, contains some statements concerning the Octave mine and neighboring operations that seriously conflict with data which I know to be reliable.

For instance, the article says that from July, 1900, to March, 1905, the Octave had "returns of shipments of bullion to the mint aggregating more than $1,500,000." The 1904 report of the Governor of Arizona to the Secretary of the Interior says that the Octave "produced more than $2,000,000 during the past four years of active operation."

The article also speaks of "other good prospects (in the Weaver district), but few have been developed to a depth exceeding 30 ft. and many have only the usual 10-ft. hole." This is certainly misleading. The Rincon mine has a shaft down 1058 ft. with 5000 ft. in lateral work. The Peterson property (seven patented claims) has a shaft 275 ft. deep with at least 1000 ft. in drifts and tunnels. The Bishop property (immediate extension of the Octave) has a 100-ft. shaft and a 1000-ft. drift. One of the Levithans has a 300-ft. shaft, and the other is even more largely developed. The Commodore (Southwestern Development Company) has one shaft 130 ft. deep, two shafts of 90 ft. each, one of 50 ft., and an aggregate of enough development work on 11 of its 22 claims to have the 11 approved for patent, averaging $500 worth of work per claim according to law. The Alvarado is said to be down 500 ft, and the Congress (which is also in the Weaver district) is down over 4000 ft. with over 50 miles of underground workings.

The fact is, there is scarcely a mining operation in this district that is not down from 50 to 200 ft. at least, and these statements of the article referred to are therefore not only incorrect but also calculated to be damaging to all the mining interests in the neighborhood of the Octave mine. H. A. BOMBERGER.

Philadelphia, Penn., Jan. 27, 1908.

Peters' "Principles of Copper Smelting" and the Metric System

In the JOURNAL of Nov. 23, pp. 985, Dr. Peters tells Professor Schaffner that the expression 0.0068572 per cent. gold in ore, would be less informing to English readers than 0.2 oz. per ton. I doubt it. But the real question is, whether 68.5 grams per ton is less informing than 2 oz. 3 dwt. 15 grains or thereabouts. We all know that a *tonne* is a million grams; but who knows how many pennyweight make a ton, long or short?

I am glad that the proportion of zinc is expressed decimally everywhere. Would Dr. Peters like to describe blende as 9 cwt. 57 lb. 3 oz. per ton?

C. HARPUR.

Nenthead, Eng., Dec. 4, 1907.

Natural ventilation is depended upon by almost all metal mines to furnish the air to the stopes. The shaft is generally the only place serving as ingress to the mine for the air. Consequently every reasonable precaution should be taken to facilitate the flow of air through the shaft. The pump, or ladder, compartment should, therefore, be lined and thus separated from the hoisting compartments; then the passage of the cages or skips through the shafts will not interfere with the air current in the pump compartment.

New Publications

MINING, MINERAL AND GEOLOGICAL LAW OF THE UNITED STATES. By Charles H. Shamel. Pp. 627; illustrated. 6x9 in.; cloth, $5. New York, 1907: Hill Publishing Company.

Contents. Geology and allied sciences—definitions. Property in minerals. Legal definitions of mineral and ore. Theories of ore formation and classification. Right of extralateral pursuit of vein. Public domain and mining laws applying. Acquisition of mining rights. Scientific definitions of veins, etc. Legal definition of vein or lode. Legal definitions of apex, strike, dip, etc. Extralateral rights. Tunnels, etc. Discussion of proposed repeal of extralateral law. Placers. Water. Miscellaneous uses of geology in law. Forms and procedure for locating mining claims. Forms and procedures for obtaining patents. Appendix. Bibliography. Classification of rocks and geological formations.

In this general notice, I shall follow a formula, dictated to me nearly half a century ago, by a great journalist, who, employing me to review a new scientific book, said:

"What my readers want to know is, first, whether such a book was needed; secondly, how the author proposes to satisfy that need, if it exists; and, thirdly, with what degree of completeness and merit he has executed his intention."

Apart from such reviews as those of Macaulay, in most of which the book under discussion was chiefly used as the text, for a brilliant essay upon its theme. I must confess that, after all these intervening years, I know of no better guide to the book-reviewer than the one I have cited, which has been, though unavowed, my rule in the discharge of innumerable tasks of this kind. Applying it in the present instance, I would say:

1. The author disclaims the purpose of supplanting by this treatise either, on the one hand, the classical works on the U. S. mining law, which will remain indispensable to lawyers, or, on the other hand, the books and monographs on geology and ore deposits, which will remain indispensable to experts in those departments of science; but he thinks there is room between these two classes for a useful book, which will enlighten the intelligent layman, interested in mining, as to the legal relations of that industry, and the geological conditions which (as I think, unnecessarily and most unfortunately), profoundly affect those relations in certain parts of the United States, though nowhere else in the civilized world. In his perception of the probable usefulness of such a book, he may be right; but I cannot help feeling that he has missed the opportunity of supplying a much more pressing general need. For the mining law which he expounds is mainly (apart from certain incidental items, which I will not here stop to enumerate), not mining law at all, but simply the system regulating the disposal of public mineral lands by the United States and the subordinate conditions imposed upon holders of possessory title by the several States and Territories included in the region to which the U. S. law applies. Now, the immensely greater part of our mining industry is carried on in States wholly outside of the region favored (or cursed) with the U. S. law of mining titles. In all those States, there are real mining laws, i.e., laws governing the operations of mining, apart from the conditions of mining titles. A summary of these statutes would have been much more useful, and would have appealed to a much larger constituency, than any abridged re-statement of the U. S. law for the sale of mineral lands, which entirely ignores the actual subsequent operations of the purchaser. However, it is not quite fair to blame an author for not having engaged in a totally different undertaking; and I content myself, therefore, with hoping that Dr. Shamel, or some other competent person, may be moved to supply what seems to me a more important contribution to the literature of true mining law. Such a contribution, if it contained a critical digest of foreign codes, might furnish to American State legislatures some hints, based upon the experience of centuries, in dealing with the problems which they have hitherto so lightly handled, chiefly at the dictation of "organized labor."

2. The method by which the author proposes to carry out his own conception is to give a summary outline of geological theories, and a summary statement of legal principles, legislative enactments, and judicial decisions, to which are added, *passim*, historical and critical comments of his own, which belong in an entirely different class, since they constitute, not declarations of existing science or law, offered for the guidance of the reader, but arguments and explanations which, however suggestive or weighty, cannot be deemed authoritative. It seems to me that nobody can be misled by the intercalated individual opinions of the author, and therefore that they do not impair the practical value of his work. Consequently, I accept his method as entirely legitimate, and worthy of such candid praise as the manner of its execution may deserve.

3. In the performance of his design, so far as the department of geology is concerned, the author has done about as well as anybody could be expected to do. Geological facts and theories ought not to be involved in the title to real estate; they are not thus involved, outside of certain regions in this country; the U. S. law for the sale of mineral land in those particular regions was framed in total ignorance of geological science as it now exists; nobody can state that science today so as to make it fit the terms of that law; and any statement of it, as a mere auxiliary portion of a manual of U. S. mining law, is likely to take up more room than it is worth, and possibly to do harm by giving the reader that "little knowledge" which is "a dangerous thing," especially if it leads him to feel that it is all he needs to know. Dr. Shamel has guarded against this mischievous result by abundant references to technical literature; and his outline of the subject, though necessarily sketchy, and perhaps somewhat uncritical, is intelligent and suggestive.

The same may be said of his statement of the law, as expressed in the U. S. Rev. statutes, together with their judicial exposition down to the present date. His statements under this head are always intelligent, generally correct, and very seldom open to hostile criticism from a legal standpoint; and, since he furnishes, for the use of those readers who desire more detailed guidance, ample references to classic authorities and official reports, I do not see how his book can be otherwise than instructive and suggestive, even to those whom it may only stimulate to further research.

In the third department of the treatment of his subject, namely, that of historical review and critical argument, and especially the author's defense of the "extralateral right," as a feature of the "law of the apex," statements and opinions are advanced with which I cannot concur, and important facts and conditions are ignored, which, in my judgment, ought to be taken into consideration. But it is impossible for me, at the present moment, to enter upon a discussion of these questions; and, therefore, thanking the author for his flattering mention of my name in this connection, I reserve for a future occasion a consideration of his views, which, whether I agree with them or not, are clearly, forcibly and courteously expressed, and constitute a timely contribution to the discussion of a question by no means yet out of date.

R. W. RAYMOND.

In assaying an ore containing about 85 per cent. silica, 7 per cent. alumina, 3 per cent. ferric oxide, 0.6 per cent. sulphur, and 0.02 per cent. to 0.03 per cent. selenium, G. B. Hogenraad (*Journ.* Chem., Met., and Min. Soc. of South Africa) found that by using carbonate of soda and an excess of litharge better agreement in check assays was obtained than if borax was used as a flux. Owing to cleaner slags, the results were higher in gold and silver without than with borax. For such ores, carrying 1 to 2 oz. gold and 7 to 14 oz. silver, he recommends the following charge: Sodium carbonate, 110 grams; litharge, 89.7 grams; charcoal, 0.3 grams; ore, 2 A. T.

Utah Copper Company

The summary of the balance sheet as of June 30, 1907, shows:—Assets: Cost of property acquired, $5,702,572; improvements, $3,330,679; ore account, $212,468; outside investments at cost, $140,000; accounts receivable, $90,580; sinking fund, $23,081; storehouse supplies, $73255; copper in transit, $425,598; bank balance, $35,802; total, $10,094,037. Liabilities: Capital stock, $5,118,000; accounts payable, $18,887; sinking fund, $16,682; A. S. & R. Co., $47,991; due to general treasury, $422,216; surplus (from sale of stock) $918,000; balance net earnings, $588,261; total, $10,094,037.

President C. M. MacNeill, in his report to the stockholders, says: "Heretofore our fiscal year has ended on June 30, but it is now proposed to change this so that it will correspond with the calendar year and consequently our next statement will embrace the 18-months period from July 1, 1907, to Dec. 31, 1908. As the new Garfield plant was not put in operation until the close of the fiscal year, results from that plant do not appear in the statement of income.

"The operation of the Garfield plant up to the present time has fully proved the accuracy of the previous estimate, although operations cannot reach their maximum for some time to come. At this time the company is producing at the rate of 3,000,000 lb. of copper per month, at a cost of less than 8½c. per pound average, for both plants. Of this output, approximately four-fifths is coming from the Garfield plant, at a cost under 8c. per lb. Our experience in mining by steam shovel has proved that our mining costs should not exceed 25c. per ton. The Garfield plant is showing results as above, notwithstanding the fact that the ore it is now receiving, and will continue to receive for some months to come, is partially oxidized and lower grade than the average ore body on account of the impossibility of preventing some of the surface oxidized material from becoming mixed with ore as it is mined by shovels. Therefore, in view of our performance under existing conditions, which cannot be brought to their highest degree of efficiency until the Garfield plant is in full operation, and the steam-shovel pits are somewhat further opened up, thus permitting the most economical working, it can be stated with confidence that we should be producing copper within the next 12 months at a cost not to exceed 7¾c. per lb."

General Manager D. C. Jackling says in his report: "The mine has been developed by approximately 90,000 ft. of underground workings. The ore averages about 2 per cent. copper, 0.15 oz. silver and 0.015 oz. gold per ton. The average thickness of the orebody in the developed zone, covering 27 acres, is about 310 ft., equivalent to 60,000,000 tons in the body. About 20,000,000 tons has been blocked out; 20,000,000 tons partially developed and 20,000,000 tons is classed as undeveloped. In the 72-acre area there is a zone of lower-grade ore averaging 1.5 per cent. copper and containing about 40,000,000 tons."

At the annual meeting of the company, the stockholders voted to authorize the issue of $1,500,000 of 6 per cent. convertible bonds, to be secured by a second mortgage on all of the company's property and convertible at the holders' option into stock at $20 per share. Proceeds of the bonds sold are to be applied to increasing working capital. The stockholders voted also to increase the capital stock from $6,600,000 to $7,500,000. Of this amount all but $150,000 is to be used in providing for conversion of the bonds. Charles Hayden and William B. Thompson were added to the directorate which is increased from seven to nine members. They are prominently identified with the Cumberland-Ely Copper Company and the Nevada Consolidated and their election to the Utah board is surmised to indicate the approach of closer relations between the three companies, but this has been contradicted by President MacNeill.

United States Steel Corporation

The December quarter showed a falling off of $11,250,290 in net earnings from the September quarter. The statement for the quarter ending Dec. 31 and for the full year is as follows:

	Quarter.	Year.
Net earnings	$32,553,995	$160,984,477
Depreciation, etc.	$ 6,177,798	$ 24,164,729
Interest, etc.	7,670,491	27,997,850
Total charges	$13,848,289	$ 52,162,579
Balance	$18,705,706	$108,821,898
Appropriations	15,346,432	93,369,257
Surplus	$ 3,359,274	$ 15,452,641

Appropriations for the December quarter were $6,304,919 for dividend of 1¾ per cent. on preferred stock; $2,541,513 for dividend of ½ per cent. on common stock; $6,500,000 for new construction and improvement. The unfilled orders on the books Dec. 31 amounted to 4,624,533 tons, which compares with 6,425,008 tons on Sept. 30, and 8,489,718 tons on Dec. 31 last year.

New Hope for the Comstock Mines

SPECIAL CORRESPONDENCE

According to recent advices, a highly important strike of good ore has been made in the lower levels of the old Comstock lode, in one of the old mines. On the 2200 level of the Ophir mine a 6-ft. vein of ore running from $80 to $100 has been encountered. This level corresponds with the 2350 of the Consolidated California & Virginia. No ore of any such value has ever before been struck at any such depth on the Comstock, and if the report proves to be correct, it will mean a new lease of life for the famous Nevada lode. Some years ago most people gave up the idea of rich orebodies being found in the Comstock lower levels, although prospecting has continued. Some of the San Francisco brokers now will not handle Comstock stocks at all, confining themselves to those of the mines in the newer Nevada camps, as they do not believe that there is anything of value in any of the Comstock mines. But should this strike be verified, it will simply prove that the great Nevada lode, like the Mother Lode region of California, carries rich ore with depth, as it did on the upper levels and that the possibilities of profitable deep mining are great, to say the least.

With electric pumps, fans and lights, and the removal of hot water rapidly, without the aid of steam, the miners may work in the deep levels of the Comstock as comfortably as elsewhere, which was not formerly the case. By ample ventilation, the situation will be much relieved. Moreover the work may naturally be carried on much cheaper than in those days when men could only work half an hour or less with the pick at one time. If rich ore is there at the depth stated in one mine, it will encourage all the others to continue sinking. The pumping systems in vogue at the present day are much more efficient and economical than those in use in the bonanza days of the Comstock.

Electricity, in supplanting steam, overcomes much of the inconvenience and cost brought about by the great heat experienced in the old days. The Comstock lode is known as one of the richest in the history of mining and it has been a disappointment to thousands of miners that its richness did not continue with the depth attained in any of the mines. This strike in the Ophir, however, will be recognized at once as disproving the conclusions drawn from the experience of late years. It is to be hoped that the private news of today will be thoroughly verified and that we shall see a revival of active and profitable mining in the old Comstock lode.

The melting point of a blast-furnace slag can be determined by forming the powdered slag, with the aid of dextrine, into pyramids the size of Seger cones, which can then be heated while the temperature is noted with a pyrometer. The melting points of iron slag, determined in this way, have been found to range from 1305 to 1465 deg. C., according to the nature of the pig-iron produced.

The Selby Smelting and Lead Company, of Vallejo Junction, Cal., is erecting a large shot tower and shot works.

Personal

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

C. F. Bahrs has returned to British Columbia from a short business trip to Mexico.

J. W. Flanagan, of El Oro, Mexico, has gone to St. Louis, Mo., on a short business trip.

John R. Stanton, who has been visiting the Lake Superior Copper district, has returned to New York.

F. J. Girard has been placed in charge of the cyanide plant at the Casa Diablo mill in Inyo county, California.

J. W. Bryant, mine manager for the Tyee Copper Company, at Mount Sicker, B. C., has gone to Mexico on business.

Malcolm MacDonald, of Tonopah, has been in Chihuahua, Mexico, making an inspection of San Toy Mining Company holdings.

W. A. Carlyle, formerly manager of the Rio Tinto mines, is now consulting engineer for Le Roi Mining Company, of British Columbia.

N. B. Storer, president of the Mexican Union Mines, has returned to Chicago from a visit to the company's properties in Jalisco, Mexico.

J. E. Maginn, Jr., has been made general manager of El Oro Exploration Company, a sub-company of El Oro Mining and Railway Company.

E. P. Earle, president of the Nipissing Mines Company, and William B. Thompson, a director, are at Cobalt, Ont., inspecting the company's mines.

B. B. Hail, general manager of the Consolidated Mining & Smelting Company, has returned to Taviche, Oaxaca, Mexico, from a short trip to the United States.

W. D. Harris, recently with the Oliver Iron Mining Company, at Eveleth, Minn., has been appointed instructor in the Michigan College of Mines, at Houghton.

Llewellyn J. W. Jones has resigned his position as general superintendent of the Tacoma Smelting Company, at Tacoma, Wash. He will travel in Europe for a year.

Paul J. Couldrey, manager of LeRoi No. 2, at Rossland, B. C., has gone to England. Ernest Levy will have charge of the mine during Mr. Couldrey's absence.

S. H. Reynolds has resigned his position as assistant city engineer of Winnipeg, Manitoba, and will engage in mining engineering at Victoria, British Columbia.

Godfrey D. Doveton, who has been dangerously ill with typhoid fever in Mexico City, has now recovered sufficiently to be moved to Cuantla, where he is rapidly recovering.

George O. Bradley, chief engineer of the Utah Copper Company, has been offered the management of the property of the Pittsburg Silver Peak Mining Company, at Blair, Nev.

Charles Of, general superintendent of the Pilleys Island Pyrites Company, has returned to New York from Newfoundland, and is now on a vacation for the winter months.

G. C. Kaufman, general manager of mines for the American Smelting and Refining Company, is on a flying trip of inspection of the company's mining properties in Mexico.

The Canadian Government has appointed Frank B. Smith inspector of mines to look after the royalties due the Government on coal lands sold in Saskatchewan and Alberta.

Allan Edyvean, for three years past superintendent of the Adventure stamp mill in the Lake Superior copper district, has resigned, and has accepted the position of master mechanic of the Ojibway mine.

Donald B. Gillis, of Tonopah, Nev., has been chosen president and manager of the San Toy Mining Company, in the Santa Eulalia district, Mexico, succeeding J. L. Hutchinson and R. R. Brown, who have resigned.

W. J. Trevarrow, for a number of years connected with the electrical department of the Calumet & Hecla mine, has taken charge of the electrical work of the Bigelow group of mines in the Lake Superior copper district.

Ormsby Gore Adams, formerly director of the Thames School of Mines in New Zealand, but more recently of London, England, has been appointed metallurgist for the Santa Ysabel United Gold Mines, Ltd., in Colombia.

Willard S. Morse, of New York, a member of the executive committee of the American Smelting and Refining Company, has taken up his headquarters at Salt Lake City and will have general supervision of the company's enterprises in Utah, Montana and Nevada.

William A. Pomeroy is at present at Palo Alto, Cal., where he is convalescing after a severe illness contracted in Mexico. He has resigned his positions with the Palmarejo & Mexican Goldfields, Ltd., and the Oxnam Prospecting Company, on account of his poor health.

George W. Theiss has been elected president of the Monongahela River Consolidated Coal and Coke Company, Pittsburg, to succeed Francis L. Robbins. Alexander Dempster is made chairman of the board of directors. Mr. Theiss was formerly vice-president of the company.

Prof. C. L. Bryden, who was for some time head of the department of mining and metallurgy in the State University of Iowa, is at present studying mining and metallurgical methods in Europe. His address for the time will be Anglo-American Club, Freiberg im Sachsen, Germany.

Charles W. Merrill, metallurgical engineer, who has been in charge of the cyanide plant of the Homestake company at Lead, S. D., has removed to Alameda, Cal., and will establish permanent headquarters in San Francisco. Mr. Merrill has undertaken metallurgical work on Nevada ores.

Obituary

L. L. Logan, who died in McKeesport, Penn., Jan. 9, was well known in western Pennsylvania as a mining engineer and an expert on coal. He was an active member of the Coal Mining Institute of America.

George V. Cresson, who died in Philadelphia, Jan. 18, aged 71 years, was for many years at the head of a large manufacturing concern in Philadelphia, known since 1893 as the George V. Cresson Company. Under him the business was built up, and he came to be generally known as a high authority on all machinery used in the transmission of power. Mr. Cresson was a member of the Franklin Institute, the Engineers' Club and the Manufacturers' Club, which he served as president for three years. He was also a member of other social and business organizations.

Societies and Technical Schools

Royal School of Mines—The 35th annual dinner of the graduates of this school will be held at the Hotel Cecil in London, March 18 next. The chair this year will be taken by Richard Pearce, formerly of Denver.

California State Mining Bureau—The new board of trustees of the Bureau has organized as follows: Harold T. Power, (of the Hidden Treasure drift mine, Placer County), president; Dr. C. T. Deane, vice-president; F. W. Griffin, secretary. The other members are Louis Janin, of Gaviota, Santa Barbara county and A. H. Ward, of San Francisco. Messrs. Griffin, Deane and Ward took the places of the three trustees who resigned, Fred W. Bradley, E. W. Stent and Curtis Lindley.

Canadian Mining Institute—At Nelson, B. C., Jan. 15 and 16, there was held a meeting of members of the Canadian Mining Institute for the purpose of forming a Western branch of the institute and for reading and discussion of papers. The president of the institute, Frederic Keffer, engineer in charge of the mines of the British Columbia Copper Company, in the Boundary district of British Columbia and the State of Washington, opened the meeting. The roll call showed 26 Western members to be in attendance, besides

11 others, most of whom were proposed for membership.

The chairman having first stated that there are now about 125 members of the institute resident in British Columbia, Alberta, Yukon Territory, and the State of Washington, and mentioned some of the advantages the organization of a local branch would insure to members, it was unanimously resolved: "That we now constitute ourselves a Western branch of the Canadian Mining Institute." The ballot for branch officers and council resulted in the election of the following: President, A. B. W. Hodges, Grand Forks, general superintendent of the Granby Consolidated Mining, Smelting, and Power Company; secretary, E. Jacobs, Victoria, editor of the *British Columbia Mining Record*; council, Paul S. Couldrey, R. H. Stewart, Rossland; Leslie Hill, S. G. Blaylock, Nelson; W. M. Brewer, Victoria; E. C. Musgrave, Vancouver; Jas. McEvoy, Fernie; O. E. S. Whiteside, Coleman, Alberta; J. C. Haas, Spokane, Wash. The Western members of the council of the Canadian Mining Institute are also members, *ex-officio*, of the council of the Western branch.

After the newly-elected president and secretary had assumed their respective duties, a general discussion took place as to the best method of carrying on the branch and making its work of practical interest to those connected with the mining and smelting industries of the West. Finally it was decided to hold three general meetings of the branch each year, at intervals of four months, and that the business of those meetings shall include the reading and informal discussion of papers.

The secretary suggested that the various mining districts of the Province should make an effort to communicate notes on the progress of mining in their districts to the secretary of the Canadian Mining Institute for reading at the annual meeting to be held in Ottawa next March, so that the development of the mining industry of the Province may be made known on that occasion.

The committee on by-laws appointed the previous day made a verbal report to the effect that the by-laws of the parent institute must govern the conduct of this branch, with such modification as shall be considered necessary by the local council. This completed the general business. W. A. Davidson, engineer of the West Canadian Collieries Company, Blairmore, Alberta, read a paper on the "Utilization of Waste at Lille Colliery and How it is Accomplished." An interesting discussion followed.

After a visit to the Canada Zinc Company's works, the afternoon session was opened. The several papers read and discussed were as follows: "Notes on Cost of Diamond Drilling in the Boundary District," by Frederic Keffer; "Handling 3000 tons of Ore per Day at the Granby Mines and Smelter," by A. B. W. Hodges; "Mineral Production of British Columbia in 1907," by E. Jacobs. Other papers were read by title. All will be presented at the annual meeting of the Canadian Mining Institute in March next and will be incorporated in the "Transactions" of the year.

At the second day's morning session resolutions were adopted expressing appreciation of the work of the Mines Department and the Geological Survey; approving of the arrangements made for extending that work; urging appropriations for extending the work and increasing the usefulness of the Bureau of Mines of the Province.

Industrial

The charcoal blast furnace of the Lake Superior Iron and Chemical Company at Manistique, Mich., has been banked for an indefinite period.

The plant of the Davis Lead Company, Butler, Penn., which has been idle for six months, has been sold to the National Lead Company, New York, for the reported price of $196,597. It is said the purchaser will start the plant next spring.

The United States Graphite Company, of Saginaw, Mich. mines amorphous graphite which it manufactures into a lubricant. The company has published a pamphlet "About Graphite Lubrication," which is sent upon request to anyone interested in the subject.

The United States Circuit Court in Chicago has issued a decree in favor of the Gandy Belting Company, of Baltimore, restraining other manufacturers from selling, advertising, or supplying stitched cotton belting painted or dyed red in imitation of the red stitched cotton belting manufactured by the Gandy company, accompanied by the word "Gandy" affixed thereto, or used in connection with the sale. It also permanently restrains them from in any way using the trade-mark of the Gandy Belting Company.

The Bausch & Lomb Optical Company, the Bausch, Lomb, Saegmuller Company, of Rochester, N. Y., and the Carl Zeiss Optical Works, of Jena, Germany, have united their interests, with the expressed purpose of carrying to the highest possible development the production of optical, physical and engineering instruments. The Bausch, Lomb, Saegmuller Company joins the Bausch & Lomb Optical Company and becomes an integral part of its organization, having no further separate existence. The Carl Zeiss Works maintains its entity in Jena. It is the intention ultimately to manufacture, and to market in the United States, the products of the Carl Zeiss Works of Jena. The new association has at its command the resources of the three organizations, including the scientific staff of the Zeiss Works, which is composed of eminent specialists.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Standard Steel Works, Philadelphia, Penn. Springs for Railway and Electric Traction Service. Pp. 36, illustrated, paper, 6x9 in.

Kingsford Foundry and Machine Works, Oswego, New York. Centrifugal Pumping Machinery. Pp. 48, indexed, illustrated, paper, 6x9 in.; 1908.

Reading Iron Company, Reading, Penn. Wrought Iron Pipe vs. Steel Pipe. Pp. 12, illustrated, paper, 6x9 in.

Construction News

Blanche, Kentucky—The Big Hill Coal Company purposes adding electric machinery and power plant to its equipment. W. E. Taylor is engineer in charge.

Martinsville, Virginia—The Henry Mica Company will open a mica mine and put in machinery for grinding. C. A. Mutchler, Columbus, Ohio, is president.

Forest, California—The Omega Gold Mining Company has decided to begin operations on its property, and will need a mill to crush cemented gravel. C. H. Brown, Forest, Sierra county, Cal., is superintendent.

Edwards County, Texas—The Texas Kaolin Company will develop kaolin property and put in machinery to prepare kaolin for market. W. E. Bradway, Chicago, Ill., is president; C. A. Goeth, San Antonio, Tex., is local manager.

Callahan, California—The Mazuma Placer Mines Company, it is reported, proposes to build a mill on Boulder creek, near Callahan, to crush ore from a property owned there. The company's address is at Callahan in Siskiyou county, California.

Bartow, Florida—A large tract of phosphate land in Polk county has been bought by a syndicate which will develop it and put in machinery. L. A. Wilson, Jacksonville, Fla., and B. H. Brewster, Calvert and Water streets, Baltimore, Md., are interested.

Snowville, Virginia—The United States Mineral Paint Corporation, it is reported, will develop ocher deposits and put in machinery for grinding, etc. The company's office is at 50 Congress street, Boston, Mass.; W. T. Stigleman, Roanoke, Va., is local manager.

Dayton, Nevada—It is proposed to put one or two dredges on the Carson river, near Dayton, Nev. The riverbed has been examined, and dredges will probably be built in the spring. J. J. Hill, of Oroville, Butte county, Cal., represents those who are concerned in the project.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at Denver, Salt Lake City, San Francisco and London

REVIEWS OF IMPORTANT EVENTS

San Francisco

Jan. 22—Near Kelso, San Bernardino county, iron ore of high grade has been found and during the past year certain parties have been obtaining control of the tract. There has been some difficulty with certain portions, but this has finally been settled in favor of the interests of L. L. Patrick, J. D. Sword and the Merritt family, formerly of Duluth. The quantity of ore in sight is represented as immense, but as yet nothing has been done with it. Fuel to utilize the ore when carried to the Coast would have to be brought from British Columbia, Washington or Alaska. Los Angeles hopes to see the ore utilized and a plant for the purpose erected in that city.

The Red Rock dry washing camp, 40 miles northeast of Mohave, Kern county, paid handsomely for a time, but since 1897 little or nothing has been done there. The work was mainly "coyoting" on the sides of the cañon and the gravel was handled in dry washing machines operated by gasolene engines, there being no water thereabouts. Only the coarse gold was obtained by the dry washers. A Los Angeles company has now been organized by J. L. Johnson, A. D. Myers, John Singleton, N. G. Cheatham and others to work the Cottontail mine. They intend to work to bedrock in the main deposit and try to develop water to wash the gravel. Suitable pumps will be installed to raise the water from the shafts if it is found in sufficient quantity.

The men at the old Sierra Buttes mine, Sierra City, have struck for recognition of the miners' union and the mine and mills are closed down as a result. The mine, once owned by an English company, was sold to Hayes Brothers, of San Jose, Cal., who reopened it a year or so since. It has not of late been on a paying basis and Supt. E. J. Olson asked the men to accept 25c. per day reduction in their wages until next May, when the wages would be restored whether pay ore was struck or not. In perfecting this arrangement the manager treated with the individual men and not the miners' union, so the latter called the men out. The superintendent refuses to recognize the union and will pay off the 75 men, and let the mine lie idle unless they agree to the proposed terms.

Nearly a year ago some rich antimony float ore, dragged up in a grain field by a harrow on the Robert Johnson ranch, five miles south of Grass Valley, attracted some attention. Ever since they have been searching for the ledge and some shafts have been sunk and cuts run. Now, however, the croppings of the ledge have been found and prospect holes are being sunk upon it. The ore found in the croppings is of good quality.

The Bonanza King mine, Trinity Center, Trinity county, is still in charge of the sheriff. James Porter, who was for a long time the superintendent, is making an inventory of all the property for the benefit of the creditors and owners.

In Placer county during 1907 the work both in quartz and gravel mining has been mainly preparatory. Very little exploitation has been done. Large expenditures of money have been made in getting ready for permanent working in 1908. This is true of nearly every mine in the county. The Hathaway, Crater, Bellevue, at Ophir, the Dairy Farm, the Midland, the Hidden Treasure, the Rueblin, Herman, Polar Star, the Paragon, the Grey Eagle, Dardanelles and Cash Rock mines are notable instances. At the latter mine the building of a dredge is the first attempt to carry on dredging at such an altitude as the upper American river.

The Oroville Gold Dredging Company, operating nine dredges at Oroville, Butte county, paid in dividends last year approximately $325,000 from gravel handled at an average cost of 3.83c. per cu.yd. Several new dredges will be installed at Oroville this year.

Keyes Brothers have laid mains and announce that they will shortly supply the town of Lodi, San Joaquin county, with natural gas from their wells. Natural gas is plentiful in this State, but is only utilized commercially at Stockton, Sacramento and Summerland. There is an abundance at the first places mentioned, but only a little is used at Summerland, there being a scant population. In the wide area around Tulare lake, in the San Joaquin valley, quantities of natural gas are escaping unused, as there are no towns, only farms and ranches, in the neighborhood. Natural gas is known to exist in quantities around Suisun bay, the upper portion of San Francisco bay, but none of it has thus far been utilized.

At the old hydraulic mining camp of French Corral, Nevada county, men from the Mother Lode counties have lately been doing considerable prospecting for quartz, and have determined that there is a well defined zone of gold-bearing quartz ledges stretching across the ridge from the Slide mine on the South Yuba river slope, northwards to the North Yuba, passing through the old Milton and Kate Hayes diggings. Ledges have been uncovered in the bedrock and traced up through the rimrocks. It is believed that these were the sources of the gold that made the gravels in some ancient river channels at French Corral so very rich. The South Yuba Mining Company already owns the Red Ledge in that vicinity, which carries copper, and a quartz ledge has been cut also. The Slide mine, a mile west of the Red Ledge, has two parallel quartz veins carrying good values.

Quartz mining is again beginning to be lively in the New River region, Trinity county. The Quimby mine, closed for over a year, is now being reopened so that the lower levels will be worked. In the Bear Tooth property, just over the hill from Quimby, exploratory work has been done in various places and the ledge has lately been found in a tunnel, the ore carrying good gold values.

A good many miners who left the mining towns of California last year for the camps in Nevada, attracted by higher wages than prevail here, are now returning to their old haunts, so that there are now plenty of available men here. The high expenses and labor troubles in the Nevada camps are not experienced in the California mining towns, where there is permanent employment at fair wages at all times.

In addition to the electric power plant at Big Bend, Butte county, recently mentioned in one of these letters, the Great Western Power Company has another great power proposition at Butt Valley, in Plumas county, on the Feather river, near Prattville. This power company owns nearly all of Big Meadows about Prattville. A few miles from the latter place this company has changed the channel of the Feather river and plans a great storage reservoir. The plan is to run a large tunnel through the hill between Big Meadows and Butt Valley. At the lower end of the valley a high dam will be constructed. The company has also purchased the rights and property of the Golden State Power Company along the Feather river, between Butt Valley and Big Bend. It is estimated that the company will eventually be able to develop over 200,000 h.p. along the Feather river.

Salt Lake City

Jan. 24—The Utah Mine Operators' Association has completed its organization by the announcement of the various com-

mittees by President John Dern. A resolution before the executive committee, indorsing the independent smelter movement, inaugurated in this city recently, received unanimous indorsement. The establishment of a Government assay office in Salt Lake has also been urged. Permanent headquarters are to be established. Local mine operators are enthusiastic about the new organization and are confident that it will greatly promote the mining interests of the State.

Indications point toward success in the effort to re-open the Ontario drain adit at Park City for transportation of ore. This adit has been closed for almost three years, during which time great difficulties were overcome while re-opening it for drainage purposes. This has been expensive and has been attended with its dangers. What is supposed to be the last obstruction in the way of the free working of the adit has been reached between No. 1 and No. 2 shaft. From a drift run around this obstruction, diamond-drill holes have been bored through to the main adit and, judging from the pressure of the water, the worst is over. Apparently it is only a matter of drilling more holes and waiting for the mines to become drained. Nearly all of the principal mines of Park City have been hampered by the caving of this adit for, with the possible exception of the Daly Judge, it is not possible to reach the lower levels of the big producing mines.

The Honerine Mining Company, with properties at Stockton, Tooele county, is in a bad shape. The corporation owes approximately $220,000, divided principally between two creditors. Some time ago an assessment of 45 c. per share was levied, but scarcely any of this amount has been paid in. It is likely that the mine will be sold to satisfy the corporation's indebtedness. Less than two years ago W. A. Clark's representatives made an offer of $750,000 for the property, which was refused, the stockholders of the company holding out for $1,250,000.

The Mammoth Mining Company, operating in the Tintic district, has been reincorporated under the laws of Nevada. The capital stock is $1,000,000 of the par value of $2.50 each.

The Swansea mine, also in the Tintic district, is about to change ownership. The Tintic Smelting Company has secured an option on enough of the stock to give it control. The property is particularly valuable to the Tintic company as a source of water supply for its smelter, which is located less than half a mile away. Construction work on the smelter is progressing favorably; the smelter will be ready for operation within 60 days.

The Utah Copper Company, having been thoroughly financed, will complete the four unfinished sections of its concentrating mill at Garfield, increasing the capacity of the plant to 6000 tons per day. Eight sections are now in operation.

The Yampa Smelting Company, has let a contract to the Allis-Chalmers Company, for two converter stands, 16 shells, a blowing engine and other equipment, which is to be added to its smelter in Bingham cañon. The contract provides that the order must leave the factory not later than Feb. 3.

The Ohio Copper Company's mill, which is being built near the mouth of the Mascotte adit, near Bingham, will be completed in about two weeks. Much of the equipment is on the ground and in process of installation. The plant will handle about 2000 tons of ore per day.

The receiver of the St. Joe Mining Company, with properties in Bingham, has applied to the courts to negotiate a loan to meet expenses. This company has been in so much litigation during the past few years that the treasury has become depleted.

Butte

Jan. 24—Those new companies which have weathered the financial storm and the discouraging copper situation are making good progress in their development work. The North Butte Extension, the Pilot-Butte, the Tuolumne, Butte-Balaklava, Butte and Superior and the Butte and New York companies have all been successful and have had abundant capital to continue work throughout the depression.

During the mining restriction the North Butte Mining Company has been pushing its development work on the 1800-ft. level and also sinking its shaft. On the 1800 the Jessie vein has just been cut, and has been found to be fully as rich as the Edith May, though much smaller. The Jessie claim is some distance north of the Edith May. The latter vein has been opened by drifts east and west a distance of 1000 ft. and the work is still going on, a large orebody being now blocked out. The vein, so far as the present development has shown, is from 8 to 25 ft. wide and is declared to be 90 per cent. first-class ore. As the vein is so much larger and the ore much richer on the 1800-ft. level than it is on any of the levels above, it is taken as a sure indication that a corresponding increase will be found at greater depth, and the shaft is being sunk with the object of opening the vein down to a depth of 2200 or 2500 ft. as soon as possible. The shaft is now more than 2100 ft. deep. In the course of the development work the North Butte company is taking out several hundred tons of ore daily, which is being shipped to the Colusa-Parrot smelter.

Denver

Jan. 24—In Cripple Creek, the rapidity with which conditions have improved, is very marked, and the general prosperity is reflected in the stock market at Colorado Springs, where, although a few weeks ago sales only amounted to $1500 or $2000 per day, the sales have reached a total of from $25,000 to $40,000 on several days lately. Many men are applying for leases there; these are chiefly men from the lead and zinc camps, where, owing to the low prices of these metals, many mines have closed down.

The deep drainage tunnel contract has been let to A. E. Carlton, the mine operator, who has ample means to carry it through. The price per foot is $28, the contract calling for a drivage of not less than 250 ft. per month.

The Mine Owners' Association has decided to make every other Sunday a holiday and change day, with no short shifts, and that change rooms shall be optional with the owners of the mines.

Indianapolis

Jan. 28—The Indiana coal industry is showing a slight improvement due to several days of cold weather and an increasing number of manufacturing plants resuming operation. Nearly all of the mines are working from three to five days per week and the indications point to the getting out of a large amount of coal between now and the last of March to be stocked in case of trouble.

The miners who are now in convention say that the probabilities of the mine-owners coming to this city for a conference on Jan. 30 are not assuring.

It is declared that there is an over-production of coal and that many of the operators would like nothing better than an opportunity of closing the mines for two months or so. This feeling is not shared by the Indiana operators who say they have no intention of closing their mines, because they are endeavoring to get Indiana coal into new markets.

Toronto

Jan. 25—The case of the Florence Mining Company vs. the Cobalt Lake Mining Company, in which the former claims the bed of Cobalt lake on the ground of previous discovery, came up again in court recently. The court followed previous rulings and held that no decision could be given in the case until the Canadian Government had given its decision, as to whether the special legislation of the Ontario Legislature, validating and confirming the title of the Cobalt Lake Company would be disallowed or not.

Frank Law, mining broker, whose trial on a charge of failing to comply with the provisions of the law in publishing advertisements and prospectuses of the Highland Mary Gold Mines, Ltd., was convicted Jan. 20, and fined $200 and costs, that being the maximum penalty.

A number of prospectors and others interested are coöperating in cutting a winter road from Cahills camp, 8 miles north of Elk Lake village on the Montreal river, to Bloom Lake. The road will pass near Hubert lake and its total length will be about 12 miles. It will render accessible an extensive area of diabase ridges regarded as presenting great possibilities.

Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents

THE CURRENT HISTORY OF MINING

Alabama

TUSKALOOSA COUNTY

Yolande—This mine, where a bad explosion occurred last month, has been reopened and damages repaired. A new mining system has been adopted and arrangements have been made to water the mine, in order to keep down dust.

Alaska

FAIRBANKS DISTRICT

A consignment of $1,200,000 gold, representing the season's work in the Fairbanks district, was recenttly received at Valdez.

Arizona

PIMA COUNTY

Twin Buttes—Work at this mine has been resumed on a limited scale. The 400-ft. level is to be thoroughly explored by diamond drilling. The pumps of the mine are in operation.

COCHISE COUNTY

Copper Queen—The smelting plant at Douglas is again in the market for copper ores. The crushing machinery, for handling limestone flux at Lee's station, nine miles east, has been started and is ready to supply 500 tons per day.

Arkansas

POLK COUNTY

American Slate Company—This company has been organized, with $200,000 capital, to open slate quarries and manufacture roofing slate. W. E. Harvey is president; D. W. Carter engineer and manager. The main office is at Kansas City, Mo.; the operating office at Big Fork, Arkansas.

California

AMADOR COUNTY

Fremont Consolidated—At this property, Drytown, the water has been removed from the 1300 level connecting the Gover with the Fremont shaft. The shaft is found to be caved from the 1150 level, where the recent fire started, to the 830 level, and repair work is now being done. No trace has thus far been found of the 11 entombed miners, so their bodies are doubtless under the cave in the shaft.

BUTTE COUNTY

Forbestown—At this old quartz camp, made famous for years by the productive Gold Bank mine, now idle, the Carlisle mine is being reopened, and the Burlington has been bonded to Eastern men.

CALAVERAS COUNTY

Melones—At this mine near Angels, 175 employees are out on strike, on refusal of the managers to concede a nine-hour day.

EL DORADO COUNTY

French—This mine at Greenwood is being examined in the interest of Mayor Morgan of Auburn, Placer county.

Vivian—This mine at Greenwood, L. E. Wilkins, manager, has finished a very satisfactory test run of 100 tons of ore.

INYO COUNTY

Black Cañon—In the mineral ground at this place, owned by H. M. Gibson and P. W. Forbes, the value of the silver-lead ledge is increasing, and in starting a new tunnel recently, zinc ore was discovered.

Casa Diablo Mill—This mill has been completed and F. J. Girard placed in charge of the cyanide plant. In the face of the Dry Bone drift there is a large body of good ore.

George-Payet—At Skidoo, H. W. Britt and E. Rivers have purchased the George-Payet claims of 13 groups, or 33 claims in all.

Golden Horseshoe—This group of eight claims on Sheep Mountain, Skidoo, is to be opened up by Victor O'Brien and associates, who recently secured the property.

Keane Wonder—The 20-stamp mill of this mine is treating 70 to 80 tons of $18 ore daily. The tramway works well. Homer Wilson is manager.

Red Rose—Active operations on development have begun to prove the value of these claims north of Bishop, owned by E. G. Rudolph.

NEVADA COUNTY

Delhi—At this mine, Hamilton Eddie superintendent, the clean-up for last month was the largest since the present company began operation.

Midas Gold Mining Company—Arrangements have been made for putting in new machinery, consisting of engine, boiler, pump, hoist, cable, etc., the new rig being intended to permit the shaft to be sunk to 600 ft.

South Yuba Mining and Smelting Company—This company, M. Martinetti, superintendent, now has a 50-ft. vein of copper ore in No. 6 tunnel. Active operations have now commenced on development.

Yuba—At this old mine, Maybert, C. A. Marriner manager, 20 stamps are now dropping and 60 men are employed.

PLACER COUNTY

Southern Cross—This mine, near Towle, after a close-down to repair mill and power house, has resumed operations with an increased force of men.

SAN BERNARDINO COUNTY

Gems—C. O. Johnson has brought in many specimens of opals from a new find near Barstow, about 16 miles northwest of Hinkley on the main line of the Santa Fe railway, and the quarry is to be opened on an extensive scale. In addition to the opals red jasper is found streaked with semi-opal; which takes a polish like marble. Several varieties of opals are found.

SHASTA COUNTY

Midas—At this mine, at Knob, they are now again dropping 20 stamps and have 70 men on the payroll. The mine was formerly a heavy producer.

SIERRA COUNTY

Dead River Mining Company—Superintendent S. M. Weiland has been instructed to resume work on the tunnel to develop the ledge on the Wyoming lode, which was discovered in November last. The property is at Smiths Flat, in Alleghany district.

SISKIYOU COUNTY

Champion Group Mining Company—This Portland, Oregon, company has bonded the Granite claim on Humbug Creek, owned by Bird, Grant & Harmon of Yreka. The mine is an old one, formerly productive.

Colorado

CHAFFEE COUNTY

Ohio & Colorado Smelting Company—This company is making some changes in its smelter at Salida and is preparing to enlarge it so as to be able to treat ore from the San Juan district and other camps of the State.

DOLORES COUNTY—RICO

Ore Shipments—Smelter returns from the first shipments of crude ore, made by the United Rico Mines Company, show that the ore averaged $990 and $1403 per

ton, respectively, per car of 20 tons. The company has shipping ore of still higher value already developed which has not yet been reached in stoping.

Pro Patria Mill—This plant, recently started, is now producing a lead concentrate running from 50 to 65 per cent. and a zinc concentrate averaging 35 per cent. The United Rico Mines Company, which owns the mill, is putting into effect a plan, whereby the zinc concentrates can be graded to 50 or 55 per cent.

Rio Dolores—Two large veins have been cut recently in the properties, two miles north of town. The extent of the ore in these veins is not yet known, but the ore is of good milling grade.

LAKE COUNTY—LEADVILLE

Griffin—This claim, west of Leadville, was located by Thomas Walsh, the millionaire, during the early eighties. Finally he discovered a body of rich ore, which netted him about $60,000. After making this money, Mr. Walsh abandoned the Griffin claim, allowing it to be sold for taxes shortly afterward. Redmond J. Cody bought the Griffin and has worked it ever since at a small profit. A small force of men is employed just at present, mining the ore in sight, which is stored in bins to await shipment in the spring, or blocking out more ore. The ore now being mined and developed is high-grade in silver and also carries gold and lead.

Hibschle—This old shaft is at the head of East Eighth street. W. H. Covey has been operating the property, but about two weeks ago he gave up his lease. The Lanphier brothers immediately secured a lease and began operations. At the present time the force has been increased so that a night and a day shift is worked. The present workings are in the center of a large body of good iron ore. This is not a new strike, for it is the continuation of an orebody formerly mined. A large body of low-grade lead ore has also been found. The ore at present being mined is on the 440-ft. level; it is thought that the water in the adjoining claim, the Coronado, will not rise higher than the 550-ft. level. Besides being above the water level this ore is situated east of the Pendery fault, which throws the ore formation in the east block, nearer the surface, than in the mines west of this fault, as is the Coronado.

Jolly—This claim is near the base of Carbonate hill at the head of East Fourth street. W. H. Campbell and associates obtained a lease on the property in July, 1907. They have installed new machinery, retimbered the shaft in places, cleaned out all the old drifts and retimbered them. This mine was last worked in 1896, during the strike of miners in this district. A large body of rich iron ore has finally been found and shipments from this property have begun.

Fanny Rawlings—T. D. Kyle, George F. Campion and others have become interested in this mine on Breece hill. The principal work now being done is the deepening of the shaft. While this work is in progress, ore is being taken out from the upper levels.

Big Chief—Mert A. Nicholson, George E. Keeler and others are leasing upon the Big Chief on Carbonate hill. At present about 100 tons of iron ore is being shipped daily to the Salida smelter; the ore carries a small amount of silver and lead. About 35 men are employed underground.

New Monarch—About 75 men are employed at the property on Little Ellen hill, and about 75 tons of high-grade gold ore is shipped daily to the Ohio & Colorado Smelting Company, whose smelter is at Salida. This smelter is owned mainly by the same parties who are stockholders in the New Monarch. J. C. Kortz, of Cleveland, Ohio, is the president of both the mining company and the smelting company. The New Monarch is not shipping as much ore as formerly, owing to extensive changes being made at the smelter. J. M. McDonald is the manager for the mining company.

TELLER COUNTY—CRIPPLE CREEK

Drainage Tunnel—The contract on this tunnel was let this week to A. E. Carlton, of Cripple Creek, at the rate of $28 per foot. At present the tunnel is in about 1400 ft. and is to be completed to about 15,000 ft. Most of the work already done was by El Paso Company which recently threw up the contract, not being able to make any money at the price called for. The contract for sinking the intermediate shaft was let to Mr. Rogers at $29.50 per foot.

Idaho

KOOTENAI COUNTY

Idaho Smelting and Refining Company—This company has taken over the Panhandle Smelter at Ponderay. George Faunce, president of the Pennsylvania Smelting Company, of Pittsburg, will direct operations. It is intended to increase the capacity of the plant.

Kansas

ALLEN COUNTY

United Kansas Portland Cement Company—This company was formed recently, with $12,750,000 capital, at a meeting held in Iola, when the Kansas Portland Cement company, the Independence Kansas Portland Cement company and the Indian Portland Cement company, were consolidated under this name. George E. Nicholson was named president of the new company; A. B. Cockerill, vice president; L. L. Northrup, treasurer, Campbell & Goshorn, attorneys. This transaction brings under one management three of the largest cement mills in the Middle West, having a combined capacity of some 9000 barrels of cement daily.

Michigan

COPPER

Alloues—No. 2 shaft is sinking below 1100 ft. and at No. 1 shaft normal production is being maintained. At the stamp mill, which is owned jointly by the company and the Continental, work on the enlargements have been suspended temporarily.

Calumet & Hecla—The work of installing the 20 boilers in the new boiler house has been completed and this plant will soon be ready to go into regular commission. At the company's power plant the third 2000-kw. generating unit is nearing completion and several motors, aggregating approximately 5000 h.p., have been delivered at the works. These motors are to be used in the new re-crushing mill and other places where steam has not yet been supplanted by electric power. The company has received three new locomotives and 150 steel 40-ton rock cars. The change to standard gage will begin early in the spring. At the new No. 18 shaft all the buildings have been completed and operations will be resumed soon.

Mass—This company is maintaining about normal production with a much reduced force of men. It is also doing considerable diamond-drill work expecting to open the same formation that was disclosed at the Lake property.

Quincy—The No. 8 shaft on the Mesnard property, is down about 4600 ft., and is opening up good stamp rock. Drifts from this shaft have been extended to the southern boundary of the Arcadian tract, now owned by the Quincy company, with continued good results. Preparations are being made to begin opening a new shaft on this tract to be known as No. 9. The site was located late in 1907 by means of diamond drills. The building which is to contain the new compressor at No. 8 shaft has been completed and the foundation is now ready to receive the machinery.

Rhode Island—This company is continuing exploratory work by means of diamond drill and shaft sinking. A drift from the eighth level, toward the Franklin, Jr., property, has encountered a good streak of copper-bearing formation.

Missouri

ZINC-LEAD DISTRICT

Barnard Mining Company—This company has been organized, with $48,000 capital, and has secured a 10-acre lease from the Granby Mining and Smelting Company. On this land, which is east of Chitwood, 7 drill-holes have showed 10 per cent. ore, rich in lead, between 100 and 147 ft. depth. The company has also

secured the Lonnetta mine, adjoining its Granby lease. On this property good ore has been found in six drill holes and in a test shaft. It is proposed to order a 150-ton mill at once.

Brooks Land—This tract, south of Zincite, has been prospected recently; ore was found in several drill holes at about 130 ft. depth. Two shafts are now down to the ore, giving about 40 ft. working face. A mill test of 200 tons showed that the ore ran about 10 per cent. zinc.

Chitwood—On a lease 1½ miles west of Chitwood, Aaron Haughton has struck good ore at a depth of 180 ft., in several drill holes.

St. Francois County

St. Joseph Lead Company—The St. Joseph and Doe Run companies have started to work full time, after reducing wages about 20 per cent. It is said that long contracts have been made for the sale of their lead. They operated on 50 per cent. production for about a month. The other mines of the district have also cut wages. The Federal, North American and Mine la Motte continue to operate on a heavily curtailed scale.

Montana

Butte District

Boston & Montana—Operating its smelter at Great Falls to full capacity, the company is enabled to produce 5,000,000 lb. of refined copper every month, and this together with about 2,000,000 lb. of copper matte, which is shipped East for treatment, is now the total product from which the Amalgamated Copper Company is deriving revenue. During the curtailment period the company reduced only about 1000 tons of ore per day, and the refinery was run at about one-third of its capacity. The company is mining about 3000 tons of ore daily, which is shipped to the Great Falls smelter for treatment. The company is still engaged in fighting the fire and gas in the Leonard and Colusa mines, and while the fire is now under absolute control it is the purpose of the company to wall it into as narrow limits as possible and keep it there. It has been almost definitely ascertained that the seat of the fire is in the old workings of the Gambetta mine, but the gas and smoke from it have prevented operations in the Minnie Healey, Leonard, West Colusa and Gambetta for a number of months. The company started to re-open the old Minnie Healey shaft for the purpose of using it in fighting the fire and as a vent, but the shaft caved in again and has been abandoned. Three other shafts are being utilized in the fight against the fire.

Butte Coalition—This company is rushing development work and during the past two weeks has opened several rich orebodies, one in the Minnie Healey, through a drift from the Rarus at a depth of 1300 ft., and the other in the Rarus ground on the 1600-ft. level. The latter is in a vein that has been worked extensively on the upper levels. On the 1600 the vein has been opened only a short distance by drifting, but the orebody, assaying from 6 to 12 per cent. copper, is from 6 to 20 ft. wide, and is improving as the drift progresses. The Rarus shaft is 1800 ft. deep and 75 ft. more will be added to it before another station is cut at the 1800. The Minnie Healey vein, on which the new orebody has been opened on the 1300, is more than 100 ft. wide, and it is the intention of the company to open practically a new mine in that ground. Eventually all the mining by the Butte Coalition Company in that section of the district will be through the Rarus and the new Tramway shafts. The Tramway is down 1250 ft. and will be sunk 300 ft. more. All the levels of the Rarus are being extended through the Minnie Healey ground and into the Tramway to connect with the new shaft on the latter. In the course of development work the Coalition company is taking out about 100 tons of ore per day, which is being stored to await an improvement in the copper situation.

Butte-Balaklava—A 28-ft. vein, believed to be the Edith May, has been cut on the 510-ft. level, and ore said to run high in copper and silver has been found.

North Butte Extension—The shaft on this property is being sunk as rapidly as is consistent with good workmanship. On the 700-ft. level a crosscut will be driven south to intercept the Blackrock vein; this is the vein from which the Butte & Superior company is mining and shipping high-grade silver ore.

Raven—The shaft on this property has reached a depth of 1100 ft., at which point a station has been cut. The vein has not been encountered below the 700-ft. level, but crosscuts are now being driven on the 900- and 1100-ft. levels; it is expected that the vein will be cut on the 900-ft. level in a short time. It is the purpose of the company to sink the shaft to a depth of 1500 ft. and open the vein at that depth.

Tuolumne—The shaft on this property is now down 1000 ft. and a crosscut has been run 200 ft. on this level. Here a wide vein was encountered, and drifting on it is now progressing. The showing is said to be encouraging.

Nevada

Esmeralda County—Goldfield

With the exception of the output of the Combination mine, last week no ore was mined at Goldfield. The high smelting rates have some influence on this curtailment but the labor trouble is the main cause. The Combination mill is running at full capacity treating about 80 tons per day, all of which comes from the Combination mine. A small tonnage is being sent to the Western Ore Purchasing Company each week from the old dump of the Mohawk-Combination lease, and from the Florence Annex lease. About 400 miners are reported to be at work in the Goldfield district. These are working at the Black Butte, Combination Fraction, Consolidated, Daisy, Florence, Jumbo Extension, May Queen, Sandstorm, St. Ives and Velvet. Some prospecting is being done at some of the claims which as yet have not become producers.

Florence Gem—On the 150-ft. level of this lease on the Cornishman claim the ore discovered a short time ago has widened to four feet. The ore is of shipping grade, while a 6-in. streak in it is reported to be very high-grade even for Goldfield. The ore in this lease is now opened on three levels, the 50-ft., the 100-ft. and the 150-ft. The ore is supposed to be an extension of the Jumbo vein. The Gem lease has five months yet to work, with a three-months' extension conditional on doing a certain amount of development work. Three shifts have been working since Jan. 16. The shaft is to be sunk another 100 ft.

Nancy Donaldson—This mine in the Red Mountain section of this district is to be extensively developed.

Florence Annex—Three shifts are working on development. The force will be increased to 100 men.

Goldfield Consolidated—The mines and leases on property belonging to this company sold ore amounting to $6,387,200 during the last half of 1907. Grading for the new mill has begun. At the Mohawk mine the building to house the new 100-drill air compressor is being erected. The new hoist installed at the Mohawk is capable of hoisting from a depth of 2000 ft.; the new pump for the 650-ft. level has arrived. Only development work is being done at the Rep Top mine.

Eureka County

United States Mining Company—This company is reported to have made the discovery of a large vein of zinc ore, 35 miles from Lovelock.

Nye County—Bullfrog

Gold Bar—The 10-stamp mill is running continuously. This mill will have a capacity of about 50 tons per day. The usual development work is being done in the mine.

Tramps Consolidated—The winze is now 300 ft. deep. A crosscut is to be driven westward from this winze.

Mayflower—On the 400-ft. level the north drift has developed the ore-shoot for a distance of 75 ft. This drift will be driven 25 ft. farther and then a crosscut will be driven. The vein is 20 ft. wide at the point of crosscut.

Golden Sceptre—It is reported that the company has made arrangements for the

erection of a 20-stamp mill. More than 3000 ft. of development work has been done on the property. This consists of three adits and three shafts with drifts. One of these drifts is 700 ft. long. The mine is said to contain considerable milling ore and some ore of higher grade.

Montgomery Shoshone—A car of concentrates was shipped last week. The covering for the cyanide tank will be finished soon. At the mine the station on the 600-ft. level is about completed and driving on that level will soon begin.

Homestake-King—Five carloads of machinery have arrived for this mill. A large force is working on the foundations for the machinery.

Johnie Consolidated—The mill, the construction of which was commenced Sept. 5, 1907, has been completed and is ready for operation. This mill has an estimated capacity of 150 tons. It is equipped with 16 Nissen batteries, the stamps in which weigh 1300 lb. and make 100 drops per minute. The capacity of the cyanide plant is 120 tons per day. The mill has an ample water supply, which is piped a distance of two miles. The ore is amalgamated and the tailings cyanided.

NYE COUNTY—TONOPAH

The ore shipments from the Tonopah mines for the week ended Jan. 16, as reported by the Western Ore Purchasing Company, consisted of 80 tons from the Tonopah Extension. The Tonopah company sent 3130 tons, the Belmont company 880 tons and the Montana-Tonopah 1100 tons to the mills, making the total shipments for the week 5190.

Tonopah Midway—The winze, being sunk on the vein, discovered some time ago, on the 800-ft. level, is now 90 ft. deep. This winze follows the footwall of the vein, which is about 50 ft. wide. The usual development work is being done on the upper levels of the mine.

Montana Tonopah—Development work is being done at various points both east and west of the shaft on the 615-ft. and the 765-ft. levels. The 40-stamp mill is running steadily. The substance of the report of the company will not be given out until the report has been mailed to the stockholders. No information can be obtained regarding the extent or value of the ore found in the lower levels below the dacite intrusion.

Tonopah Extension—The usual tonnage is being mined on the levels above the 600-ft. level.

West End Consolidated—This company is doing considerable work outlining the apex of the vein, which has caused the law suit with the MacNamara company. The usual development work is being done on the 400-ft. level and the usual tonnage is being mined.

North Star—On the 1250-ft. level a drift is being driven westerly on the fault plane; considerable quartz is showing in the drift. Ore is being stoped on the 900-ft. level.

Little Tonopah—The north crosscut on the 880-ft. level is now 680 ft. long.

STOREY COUNTY

According to the weekly reports of the mine superintendents, the usual amount of work was done at the different properties during the week ending Jan. 18. During the week the hydraulic elevator was stopped 10 hr. to save pressure water; No. 3 Reidler pump was stopped 80 hr. for repairs; No. 1 and No. 2 Riedler pumps ran full time. On Jan. 18 the surface of the water in the Consolidated Virginia shaft was 110 ft. below the 2350-ft. station and in the Combination shaft the surface of the water was 227 ft. below the measuring point in that shaft. Good headway is being made in the erection of the building to house the new hoist at the Ward shaft. Excavations for the foundations for the suction fan have begun.

Ophir—Besides repairing jointly with the Consolidated Virginia company the northeast drift on the 1800-ft. level, 182 cars of ore have been mined from the north stope on the 2100-ft. level; 109 cars of ore have been mined from No. 2 northeast stope and 45 cars from the northeast sill-floor drift of the 2200-ft. level. The ore shipped to the Kinkead mill amounted to 312 tons of second-class ore.

Silver Hill—Prospecting has been continued on the upper levels; 50 cars of ore were mined.

Potosi—Royalties from ore, mined during December by lessees working in the upper levels, amounted to $370.55. The usual development work was done.

WHITE PINE COUNTY

Nevada Consolidated—The new bond issue of this company is said to have been subscribed twice over. It is gossiped that efforts will be resumed toward a consolidation of this company with the Cumberland-Ely.

New Jersey

MORRIS COUNTY

Glendon—Operations have been suspended in this mine at Hibernia on account of a squeeze which has almost closed the adit and cut off access to the mine. Earth shocks and movements had been felt in the mine for some time, but the final squeeze or cave came so unexpectedly that the mine locomotive was wedged in, and could not be taken out. The Glendon is one of the Wharton properties, and is one of the oldest of the group of iron mines near Hibernia.

The Wharton Steel Company has decided to close both the Glendon and the adjoining Andover mine, to avoid serious accident.

New Mexico

BERNALILLO COUNTY

Sandias Mining and Milling Company—This company is shipping about 8 tons of lead ore daily from the property near Albuquerque, which it has recently acquired. The ore occurs with fluorspar in a well defined vein, and it is reported that none of the samples show even a trace of zinc. Ore is taken from a drift about 40 ft. down. Power is installed for hoisting.

North Carolina

DAVIDSON COUNTY

On the Jones property, near Thomasville, the results have been so good lately that Capt. M. L. Jones, the owner, is preparing to add 20 stamps to the mill.

LINCOLN COUNTY

Piedmont Tin Mining Company—This company has its machinery in place and will soon begin work on its property near Lincolnton.

Pennsylvania

BITUMINOUS COAL

Atlantic Coal Company—This new company has secured a tract of coal land in Jenners township, Somerset county, and proposes to work it soon. The officers are: A. J. Field, New York, president; Grant Emmons, New York, secretary; Frank S. Black, Meyersdale, Penn., treasurer.

Maryland Coal Company—This company has completed arrangements to develop the coal property, which it bought some time ago, on the South Fork, near Johnstown. Three openings are to be made and a new town built, which will be called St. Michael. The town and the mine workings will occupy the basin of the South Fork reservoir, the breaking of which resulted in the Johnstown flood.

South Dakota

LAWRENCE COUNTY

American Eagle—The new 200-ton cyanide wet crushing mill will be ready within another month, when the mine force will be increased. The mill employs the Burt filter press. The company is controlled by Minneapolis capital.

Blue Ridge—Extensive work is being done on this property adjoining the Golden Reward, by P. O'Dwyer and associates. A continuation of the Sundance-Lucile vein has been opened up and ore of medium grade developed. It is probable that the ore will be shipped for treatment.

Echo—The new electric machinery just installed has been started and the tunnel will be continued 1000 ft. further.

Golden West—Extensive development has been started in the open cut. A double-compartment shaft is being sunk

on an old ledge that has been for some years supplying the mill. An air compressor will soon be installed.

Lucky Strike—By February it is expected to have the 40-stamp mill of the company on Elk Creek in operation.

Pluma—Superintendent Filion is making preparations to resume operations at once in the new shaft, which will be continued to the 800-ft. level. It is the intention to undercut the body of free milling gold ore.

Puritan—Reorganization has now been effected, the new company incorporated under the laws of Wyoming being the Alta Mining Company. O. N. Snow and associates of Kansas City, Mo., hold controlling interest. A $100,000 bond issue is now being subscribed to supply working funds and pay off old indebtedness.

Wasp No. 2—A new record has been established by Manager Gray. With the addition of electric power, skips instead of cars and doing away with mules, he has reduced the operation to $1.30 per ton for mining and milling. A 100-ft. tunnel for the skips from mine to mill has been just completed.

Mogul—In the JOURNAL of Dec. 27 last our local correspondent said: "Manager McLaughlin announces that it is probable that the company will commence paying dividends shortly after the first of the year. The $300,000 bond issue is about to be called in with the accumulated profits now in the treasury."

Manager W. L. McLaughlin writes under date of Jan. 20. "This paragraph was doubtless based upon a statement in the Deadwood *Telegram*, of Dec. 13, in which it was said that it was likely that a dividend might be declared the first of the year, but this was qualified by a statement that it depended entirely upon the board of directors and they might decide to create a surplus, or to pay the outstanding bond issue amounting to $300,000. The last sentence in the paragraph is misleading, as it would imply that we had the money on hand to pay off the bonds, which is not the case."

Utah

SALT LAKE COUNTY

Utah Consolidated Mining Company—According to press reports this company has completed arrangements for the smelting of its ore by the American Smelting and Refining Company. The contract is stated to cover the treatment of 300,000 tons of ore annually; the contract is binding for one year, but can be extended for another year at the option of the Utah Consolidated Company. This will enable this company to have ample time to erect a new smelter if desired.

SUMMIT COUNTY

Silver King Coalition—A small force is retained on development work and the mill is running about one-third time. It will probably be some time before the mine is in full blast again.

Daly Judge—The new electric haulage system is being operated successfully. The company is doing development work mainly.

UTAH COUNTY

United States Ozocerite Company—A suit has been instituted in the courts against this company to foreclose a trust deed. The property involved is located in Spanish Fork cañon.

Washington

KITTITAS COUNTY

Washington Quicksilver Mining Company—This company, of Ellensburg, prosecuted development work in 1907 and intends to erect a mill this year.

Canada

ALBERTA

Royal Collieries—Mining is going on steadily at this coal property on Belly river, near Lethbridge. Arrangements are being made to put in machinery for extensive work next spring, when a branch of the Canadian Pacific will be completed to the mine.

BRITISH COLUMBIA

Consolidated Mining and Smelting Company of Canada, Ltd.—The estimated production of the mines and smelting works of this company during the calendar year 1907 was as follows: Centre Star-War Eagle group, Rossland, 132,316 tons of ore of an average assay value of gold 0.4 oz., silver 0.38 oz. per ton, and copper 0.7 per cent. Snowshoe mine, Boundary district, 125,000 tons of ore of an average assay value of gold 0.06 oz., silver 0.3 oz. per ton, and copper 1.4 per cent. St. Eugene mine, East Kootenay, 23,324 tons concentrate containing 27 oz. silver per ton, and 58 per cent. lead. About 6500 tons of lead-silver concentrate was shipped to Europe, and nearly 17,000 tons to the company's own smelter at Trail. The approximate total value of the metals produced at this smelter was $4,982,000 as compared with $3,786,146 for the fiscal year ended June 30, 1907. These totals include value of metal contents of custom ores as well. The production of the smelter from March, 1898, to date is about $28,000,000 in all.

BRITISH COLUMBIA—BOUNDARY

Granby Consolidated—The steel flue chamber in course of construction at this company's smelter is nearing completion. This structure, designed by the company's general superintendent, A. B. W. Hodges, contains about 400 tons of steel, and 15 men have been employed in erecting it.

BRITISH COLUMBIA—LARDEAU DISTRICT

Ferguson Mines, Ltd.—Production in 1907 of this company's Silver Cup mine, near Ferguson, has been about 150 tons of silver-lead ore per month. Average value per ton in gold, silver and lead at present market prices is approximately $140.

BRITISH COLUMBIA—ROSSLAND

Le Roi Mining Company—The eighth ordinary general meeting was held in London, England, on Dec. 23. The managing director, A. J. McMillan, who left Rossland for England at the end of October to attend that meeting, is expected to return to British Columbia before the end of January. As a result of the fall in the price of copper the output of ore from the mine is being restricted to that of generally higher grade than the average of shipments when the price was high.

BRITISH COLUMBIA—SOUTHEAST KOOTENAY

Crow's Nest Pass Coal Company—The output of 24,536 tons of coal during the week ended Dec. 13, giving an average of 4089 tons per working day, was the largest production for one week made by the company for some time.

NOVA SCOTIA

The Government has decided to appoint an expert commission to study the question of mining coal from submarine areas.

Lake Copper Company—This company has been organized to work copper deposits at Polson Lake, near Antigonish. M. V. Grandiu, Eastern Harbor, is president; H. G. Dunbar, secretary and treasurer. A. G. Baillie, Port Hastings, general agent.

NOVA SCOTIA—CAPE BRETON

Barium Production Company—This is a new company organized in New York to work the barytes deposits at Lake Ainslee in Cape Breton, and to manufacture barium salts.

ONTARIO—COBALT DISTRICT

Ore Shipments—Shipments of ore for the week ending Jan. 18, were as follows: Buffalo, 63,000 lb.; La Rose, 296,000; Nipissing, 64,540; O'Brien, 120,200; Kerr Lake (Jacobs), 39,980; King Edward, 64,870; total, 648,590 pounds.

Cleveland-Cobalt—A new vein of calcite, 7 ft. wide, showing low silver content, was struck last week at the 125-ft. level at a distance of 70 ft. from the main shaft.

Cobalt Lake—A vein 2 ft. 6 in. wide, carrying native silver, has been struck in a drift under the lake at the 86-ft. level, about 100 ft. north of the main shaft. Development is being pushed with a force of 65 men. The company has on hand about four cars of high-grade ore.

Kind Edward—Recently several hundred pounds of nuggets and native silver, which were kept in a box, were stolen.

Peterson Lake—The shareholders of the company, at a meeting held in Toronto in January, refused to ratify an arrangement made by the directors to sell to the Nova Scotia Mining Company, 30

acres of land for 150,000 paid up shares of the latter company. The proposal to lease 10 acres on the west side of the lake for 5 years to the Little Nipissing Mining Company was adopted. The lessees are to pay a royalty of 25 per cent. on the output.

ONTARIO—JAMES TOWNSHIP

Casey Bros. Location—Some fine discoveries of native silver have been made on this claim in the Silver Lake district. A few nuggets of nearly pure silver are being taken out.

Clinton Locations—C. M. Clinton, of New York, who has four claims at Silver lake, has made several good discoveries, including a galena vein showing, on the surface, 40 per cent. lead and 40 oz. silver to the ton. Another vein shows 2 in. of solid smaltite with silver indications; a 5-in. calcite vein has proved rich in wire silver and small silver nuggets.

Downey's Claim—On this location, near Silver lake, native silver has been struck at a depth of 45 ft. in a shaft sunk on a bornite showing.

ONTARIO—PORT ARTHUR DISTRICT

Liberty Bell—This property at Atikokan, near the line of the Canadian Northern Railway, has been acquired by a syndicate of New York and Philadelphia capitalists, headed by F. A. Holbrook, of New York. The company will carry on development with R. M. Wallace as manager. Assays of ore show $82 to the ton. A 20-stamp mill will be installed.

Mexico

CHIHUAHUA

San Rafael—At this mine, at Terrazas, a good body of lead ore has been cut in sinking the two shafts, but no development has as yet been done.

Hill Syndicate—C. L. Graves, the general manager of this corporation recently formed in New York, has been for the last 10 years a resident of Chihuahua and until recently general manager of the Chihuahua & Pacific Railroad. He is particularly interested in the Almoloya district, and this leads to the belief that the new syndicate will operate properties in Chihuahua.

Lepanto—This mine is at present shipping from 80 to 100 cars of ore to the Monterey smelters per month. The output will be increased as soon as new machinery can be installed.

GUANAJUATO

Plans and specification for the junction of the Guanajuato Mineral Belt Railway with the Mexican Central have been completed and accepted by the Central. The construction will be made by a system of parallel tracks starting from a point about one kilometer outside of the town of Guanajuato, and will run parallel with the Central tracks into Guanajuato. The arrangements of the parallel tracks will be such that less than carload lots can be transferred without trouble, while full carloads can be transferred to either track. The one kilometer of parallel tracks will be one comparatively level stretch of ground. At the present time, all freight destined for the Guanajuato mines and mills can be hauled only as far as Marfil, which is located about six kilometers outside of Guanajuato. The Central branch to Guanajuato is practically finished and will be opened for traffic as soon as the necessary terminal station and freight stations are completed. This work should be finished and opened to the public March 1.

JALISCO

Santo Domingo Mining Company—This company will erect an electric plant on San Diego river to supply power for the mines of the Hostotipaquillo district. The San Domingo mine is now 3000 ft. deep and the proportion of silver is decreasing, while that of gold is increasing.

Real Alto Mining Company—This company is planning the erection of a mill and concentrating plant at its properties in the San Sebastian district. Development work is in progress in two of the mines acquired last year, the Santiago and Las Cruces furnishing enough ore to supply a small mill.

Amparo Mining Company—The 40 stamps of the new mill in the Etzatlan district are crushing about 150 tons of ore per day. The plant consists of crushing machinery, concentrators and a cyanide plant. An aërial tramway carries the ore from the mine to the mill.

Africa

RHODESIA

Production of mines other than gold for the year 1907 is reported as follows: Silver, 147,324 oz., an increase of 36,748 oz.; lead, 756 tons, increase 104 tons; copper, 81 tons, increase, 37 tons; chrome ore 8016 tons, increase, 4369 tons; tungsten ore, 51 tons, increase 34 tons. The production of coal from the Wankie mines was 115,073 tons; increase, 11,270 tons.

TRANSVAAL

The number of men employed in Transvaal mines and mills on Dec. 1 was: white, 19,479; colored, 147,474; Chinese, 40,055. As compared with July 1 this shows an increase of 522 whites and 12,417 colored men; with a decrease of 11,417 Chinese. The total number employed on Dec. 1 in gold mines and mills was 184,413; in gold placer working, 239; in coal mines, 9686; in diamond mines, 9798; in other mines, 1974; in chemical works, etc., 898; total 207,008 persons.

WEST AFRICA

Gold production in December is reported at 23,699 oz. bullion, being 1690 oz. less than in November. For the year ended Dec. 31 the total was 225,959 oz. bullion in 1906, and 289,780 oz. in 1907; an increase of 63,821 oz. The bullion reported in 1907 was equal to $5,627,970, or 272,277 oz. fine gold.

Asia

INDIA—MYSORE

Kolar Goldfield—The gold production reported in December was 52,115 oz. bullion, which is 6237 oz. more than in November; 2134 oz. more than in November, 1906; and the largest monthly production reported since December, 1905. For the year ended Dec. 31 the production was 576,287 oz. bullion in 1906, and 549,731 oz. in 1907; a decrease of 26,556 oz. The bullion reported in 1907 was equal to $10,226,648, or 494,758 oz. fine gold.

Europe

SPAIN

Exports of metals from Spain for the 11 months ended Nov. 30 are reported by the *Revista Minera* as follows, in metric tons:

	1906.	1907.	Changes.
Pig and manu. iron	50,473	53,206	I. 2,733
Copper	8,049	8,258	I. 209
Copper precipitate	19,778	16,845	D. 2,933
Spelter	1,482	1,321	D. 161
Lead	167,136	164,494	D. 2,642
Quicksilver	1,487	1,500	I. 13

Exports of minerals for the 11 months were as follows:

	1906.	1907.	Changes.
Iron ore	8,512,305	8,108,201	D. 404,104
Copper ore	1,027,731	1,115,232	I. 87,501
Manganese ore	86,760	62,368	D. 24,392
Zinc ore	128,492	143,833	I. 15,341
Lead ore	4,077	5,114	I. 1,037
Pyrites	991,038	1,216,919	I. 225,881
Salt	407,120	452,757	I. 45,637

Exports of sulphur were 898 tons in 1906, but fell to 2 tons last year.

New Caledonia

Exports of minerals from the colony for the 10 months ended Oct. 31 are reported by the *Bulletin du Commerce*, of Noumea, as follows, in metric tons: Nickel ore, 84,582; cobalt ore, 3234; copper ore, 432; iron ore, 53; chrome ore, 21,466; magnesite, 42 tons.

An examination of the petroleum deposits of Koumac is being made by Mr. Houston, an Australian engineer, with a view to their working.

An engineer from India, Mr. Hamilton, has been examining several deposits of manganese ore on the west coast of the island.

New Zealand

The Mines Department reports the exports of gold from New Zealand for October and 10 months ended Oct. 31 as follows, in ounces of bullion:

	1906.	1907.	Changes.
October	57,291	26,167	D. 31,124
Ten months	469,320	408,248	D. 61,072

The bullion reported in 1907 was equal to $7,933,723, or 383,828 oz. fine gold.

Silver exports in 1907 were 145,302 oz. in October and 1,352,691 oz. for the 10 months. Other imports included 98 tons of antimony and 121 tons of scheelite.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, Jan. 29—The bituminous-coal trade in the East continues dull, and there is very little doing, except on contract deliveries. Little has been done in the way of clearing out terminals, and new business is scarce.

The anthracite trade had a little spurt from the spell of cold weather and snow; but it did not last, and the trade is flat again.

In the West the trade is feeling the effects of financial stringency, and is dull almost everywhere. The demand for steam coal is light.

The miners' convention at Indianapolis is still in session. The outlook for a joint conference of miners and operators is still uncertain.

Coal Traffic Notes

Tonnage originating on Pennsylvania Railroad lines east of Pittsburg and Erie, year to Jan. 18, in short tons:

	1907.	1908.	Changes.
Anthracite	270,447	247,484	D. 22,963
Bituminous	2,109,498	1,704,452	D. 405,046
Coke	730,785	325,385	D. 405,400
Total	3,110,730	2,277,321	D. 833,409

Period covered was 19 days in 1906 and 18 days this year.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the year to Jan. 25 were 48,651 tons.

Coal shipments reported by Southwestern Inter-State Coal Operators' Association, 11 months ended Nov. 30, short tons:

	1906.	1907.	Changes.
Missouri	2,271,300	2,606,088	I. 334,788
Kansas	4,538,928	5,864,555	I. 1,325,627
Arkansas	1,513,086	2,101,362	I. 588,276
Oklahoma	2,087,509	2,707,840	I. 620,331
Total	10,410,823	13,279,845	I. 2,869,022

Oklahoma includes the mines formerly reported under Indian Territory.

Coal shipments and receipts at all Lake ports for the year to Dec. 1 were:

Shipments:	1906.	1907.	Changes.
Anthracite	2,912,625	3,928,859	I. 1,016,234
Bituminous	11,864,986	14,946,071	I. 3,081,085
Total ship	14,777,611	18,874,930	I. 4,097,319
Receipts:			
Anthracite	2,745,172	3,792,955	I. 1,047,783
Bituminous	11,802,356	14,693,689	I. 2,891,333
Total	14,547,528	18,486,644	I. 3,939,116

Coal supplied for steamship use was 1,934,705 tons in 1906, and 1,985,060 tons in 1907. The excess of shipments over receipts is accounted for by coal delivered to Canadian ports.

The State mine inspector reports coal mined in Maryland in 1907 as follows: Allegany county, 4,571,269; Garrett county, 226,942; total, 4,798,211 tons, showing an increase of 294,013 tons, or 6.5 per cent., over the previous year.

New York

Anthracite

Jan. 29—The hard-coal market is weak and the demand is light. Both prepared and small steam sizes are in good supply and prices have suffered for all. Prepared sizes are being offered at from 20 to 30c. below the circular price, although the large producers quote no change. Current quotations are as follows: Broken, $4.30@4.45; egg, stove and chestnut, $4.75@5; pea, $3.05@3.20; buckwheat, $2.20@2.45; buckwheat No. 2 or rice, $1.60@1.80; barley, $1.20@1.35 per ton f.o.b. New York harbor.

Bituminous

There is little to be said about the soft-coal market since business is almost at a standstill. There does not seem to be much coal at the shipping ports. This is because coal is being steadily absorbed, although in small amounts, and very little is being shipped; hence the supplies are gradually growing less. The embargoes are still in force and most coal is sold subject to them. Prices in New York harbor range from $2.20 per ton up. Trade in the far East is dull and considerable coal seems to be accumulating at the unloading ports. Trade along the Sound shows a small demand, but little business is being done. Transportation from mines to tide is slow but car supply is up to all requirements.

In the Coastwise market vessels are in abundant supply and captains are begging for business. Freight rates can be arranged at practically the shipper's own terms. Nominal quotations are 65@70c. around the Cape.

Birmingham

Jan. 27—There is little improvement in the coal production in Alabama this year, though there is yet a big difference as compared to the output at present and what it was six months ago. The demand is good on the outside but the furnaces are idle and other consumers in the local field are cutting down so that it is felt. The Alabama Consolidated Coal and Iron Company has started up one of its mines with non-union labor and men are being placed at one of the remaining mines. The coke situation in Alabama shows no improvement, the demand being a little slow and the production off considerably.

Pittsburg

Jan. 28—The mines in the Pittsburg district are being operated to less than half capacity, except those loading for the river trade, which are running full. Prices are not strong, but quotations are still based on mine-run coal at $1.15 at mine. Operators are arranging to meet the miners' representatives during the coming week to discuss the wage scale, the present two-year agreement expiring on Mar. 31. No plans have yet been made, and no one has expressed an opinion on the probable demands that are to be made.

Connellsville Coke—There has been a further weakening in coke prices and $1.75 can easily be done for spot furnace coke. Under contract the price has been $2@2.25, but a deal has been closed for a fairly large tonnage at $1.90. Foundry coke prices are more firmly held and quotations are $2.50@2.75, although no sales have been recorded lately at the latter figure. One large interest has closed contracts for 9000 tons of foundry coke, all at $2.50 f.o.b. ovens. The *Courier* in its weekly summary gives the production in both regions at 143,838 tons, and the shipments were 5517 cars distributed as follows: To Pittsburg, 2546 cars; to points west of Connellsville, 2542 cars; to points east of Connellsville, 429 cars.

Foreign Coal Trade

Imports and exports of coal in Germany, 11 months ended Nov. 30, in metric tons:

Imports:	1906.	1907.	Changes.
Coal	8,375,324	12,549,210	I. 4,173,886
Brown coal	7,763,119	8,163,146	I. 400,027
Total	16,138,443	20,712,356	I. 4,573,913
Exports:			
Coal	17,973,574	18,115,223	I. 141,649
Brown coal	16,861	20,039	I. 3,178
Total	17,990,435	18,135,262	I. 144,827

Imports of coke in 1907 were 538,739 tons; of briquets, 175,030 tons. Exports of coke, 3,471,691 tons; of briquets, 1,126,539 tons.

Coal production of Germany, 11 months ended Nov. 30, in metric tons:

	1906.	1907.	Changes.
Coal	125,693,158	131,393,100	I. 5,699,942
Brown coal	51,329,874	56,853,293	I. 5,523,419
Total mined	177,023,032	188,246,393	I. 11,223,361
Coke made	18,475,721	20,025,165	I. 1,549,444
Briquets made	13,345,283	15,043,730	I. 1,698,447

Of the briquets reported last year

11,830,479 tons were made from brown coal, or lignite.

Nova Scotia coal shipments, by companies, are reported as follows, for the full year:

	1906.	1907.	Changes.
Dominion	3,131,053	3,193,000	I. 61,947
N. S. Steel	658,745	623,163	D. 35,582
Acadia	274,712	321,912	I. 47,200
Intercolonial	280,418	274,388	D. 6,030
Cumberland	379,557	276,717	D. 102,840
Inverness	202,562	243,075	I. 40,513
Total	4,927,047	4,932,255	I. 5,208

Local sales, etc., bring the total for 1907 to 5,170,000 tons.

Fuel imports and exports in France, 11 months ended Nov. 30, metric tons:

Imports:	1906.	1907.	Changes.
Coal	13,135,820	13,506,610	I. 370,790
Coke	2,062,200	1,986,540	D. 75,660
Briquets	508,580	627,380	I. 118,800
Total	15,706,600	16,120,530	I. 413,930
Exports:			
Coal	1,236,220	1,066,620	D. 169,600
Coke	156,740	151,110	D. 5,630
Briquets	116,720	108,160	D. 8,560
Total	1,509,680	1,325,890	D. 183,790

Exports include fuel supplied to steamships at French ports.

Imports of fuel into Spain for the 11 months ended Nov. 30 were 1,734,587 metric tons of coal, a decrease of 284,431 tons; and 227,652 tons of coke, an increase of 22,763 tons.

Iron Trade Review

New York, Jan. 29—The iron and steel trades remain quiet, and the market is a waiting one. Buyers hesitate to make any engagements until they are sure of their ground. While the financial condition is improving, there is not yet apparent any disposition to invest in new construction, and certainly there is no desire to accumulate finished products for market.

There have been some sales of pig iron, chiefly to pipe foundries, which seem to have more work on hand than any other class of factories. On most of these sales concessions have been made, but it is difficult to ascertain the actual prices. In fact, most of the iron sold this month has probably gone at figures below the nominal quotations.

It is reported that some sales Southern iron for export have been made at a delivered price which works out at about $10, Birmingham.

Another meeting of the advisory committee is to be held soon, to consider further the question of maintaining steel prices.

Baltimore

Jan. 29—Imports for the week included 141 tons ferro-manganese. Receipts of iron ore were 3600 tons from Cuba; of manganese ore, 6900 tons from India and 1400 from Cuba, making 8300 tons in all. There were 8375 tons of pyrites received from Spain.

Birmingham

Jan. 27—While the buying is not in big lots, as was reported last week and the week before, there is considerable business being transacted in pig iron. The Tennessee Coal, Iron and Railroad Company has five out of the six furnaces at Ensley in operation making basic iron. The Woodward Iron Company is reported as having made some good sales to cast-iron pipe interests and others. All companies in the Birmingham district are now maintaining a rate of $13.50 per ton for No. 2 foundry. Considerable iron under No. 2 foundry grade has been disposed of this month, the greater portion in small lots.

There is a little work being done in the Birmingham rolling mills, nine puddling furnaces and a guide-mill being in operation with non-union labor. It is understood that a proposition is to be made this week to the Republic Iron and Steel Company by officials of the Amalgamated Association looking to a resumption in full force of the two big rolling mills of the company in this section.

Philadelphia

Jan. 29—There is no sign of departure from the combination prices in pig iron. The large dealings in Southern iron are attracting a good deal of attention, particularly in pipe iron. Large local interests have made extensive purchases of pipe iron at favorable prices. Considerable business has been done in Southern forge, and from what can be learned today, a number of transactions are pending which will take the form of orders before the close of the week. The Pennsylvania makers are endeavoring to hold the fort on forge and foundry iron, and to all appearances they will do so, even though their sales will not be gratifying. Basic iron has been selling more freely, but in what might be termed sample lots, and the consumers cannot be tempted to place heavy orders. A few sales of low phosphorus have been made and some additional business is promised next week. The entire tone of the market is far from gratifying.

Steel Billets—Very little actual business has been done up to today. Some negotiations have been dragging along, but buyers and sellers have not agreed.

Bars—Our market is irregular as to prices, there being some business transacted at less than the quoted prices. The stores are doing most of the business.

Sheets—The sheet mills have been favored by a few good sized orders for heavy sheets, but the business was secured at concessions.

Pipes and Tubes—The heavy suspension of locomotive building is reflected in extreme dullness in tubes. Small boiler shops are fairly busy, but there is very little being done in big tube consuming plants.

Merchant Steel—The retailers of merchant steel in this market report an improving retail demand out of stocks, but the agents have not succeeded in sending large orders to the mills.

Plates—The opinion expressed today with reference to steel plate is that there will be a slow improvement from the smaller buyers.

Structural Material—Structural material is doing next to nothing. The railroad people are not asking for much material and what little business is being done is captured by the independents.

Steel Rails—The railmakers are doing a retail business in light rails, and their agents are scouring the country for orders without very much success.

Old Material—Heavy cast scrap has been reduced 50c. per ton on a few recent sales, and railroad scrap is in a little better demand, though the quantities taken are small.

Pittsburg

Jan. 28—The improvement in the iron and steel trade is so slight that it can be scarcely noticed. In wire, tin-plate and structural material new business is coming in. A small run of orders is being booked in different lines which will keep a number of mills fairly active for a few weeks. The Republic Iron and Steel Company is still running its three big plants in the Youngstown district and will blow in Haselton No. 2 blast furnace tomorrow; another Haselton furnace likely will go in early next week. The Republic company this week is operating in the West its East St. Louis, Moline, Muncie and Massillon plants. The plants of the Carnegie Steel Company at Homestead, Duquesne, Clairton, Braddock, New Castle and Youngstown are running and preparations are being made to start the Mingo works. The low prices at which light rails have been offered by the re-rolling rail mills has induced the Carnegie company to cut the price of light rails $2 a ton. There is nothing doing in standard sections. The American Sheet and Tin Plate Company is operating 155 of its 242 tin-plate mills. Business in tin-plate has not been up to expectation since the reduction in prices, but some large contracts are under negotiation. All the wire mills in this district are busy, and prices, as announced recently, will not be changed The American Steel and Wire Company has advanced the price of wire-rods $1 a ton to $35 for bessemer and $36 for open-hearth. There has been more shading of iron-bar prices and several sales for Pittsburg delivery were made during the past few days at 1.35c. Steel bars are also being cut, but the large interests continue to hold the price at 1.60c., Pittsburg.

Pig Iron—Prices for all grades of pig iron continue weak and transactions are light. Several sales of small lots for prompt shipment were recorded this week. Bessemer is down to $17, foundry and basic to $16 and gray forge, $15, all f.o.b. Valley furnaces. Some of the large furnace interests are holding bessemer at $18 and No. 2 foundry at $17, but it is not expected that any business will be done at those figures.

Steel—There have been no transactions in billets lately and the makers are holding both bessemer and open-hearth billets at $28. The Carnegie Steel Company has cut the price of light rails $2 a ton. Sheet bars remain at $29, tank plate at 1.70c., and steel bars at 1.60c.

Sheets—New business in sheets is confined to small tonnages for early delivery. Prices remain unchanged, black sheets being quoted at 2.50c. and galvanized at 3.55c. for No. 28 gage.

Ferro-manganese—The market is stronger this week, the price having advanced about $1. Quotations are $49.50@50 per ton.

Metal Market

Gold and Silver Exports and Imports

NEW YORK, Jan. 29.
At all United States Ports in Dec. and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Dec. 1907..	$ 1,004,441	$44,448,509	Imp. $43,444,068
" 1906..	1,880,895	7,617,237	" 5,736,342
Year 1907..	55,215,681	143,398,066	" 88,182,385
" 1906..	46,709,158	155,579,380	" 108,870,222
Silver:			
Dec. 1907..	4,407,485	4,315,452	Exp. $92,033
" 1906..	7,404,905	3,999,269	" 3,405,636
Year 1907..	61,619,653	46,005,776	" 15,613,877
" 1906..	60,957,091	44,227,841	" 16,729,250

Exports from the port of New York, week ended Jan. 25: Gold, $22,500 to West Indies; silver, $826,646, chiefly to London. Imports, gold, $396,616; silver, $142,077, from Cuba, Mexico and South America.

Specie holdings of the leading banks of the world, Jan. 25 are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York	.....	.....	$250,242,700
England	$186,661,315	.....	186,661,315
France	536,676,945	$182,986,935	719,663,880
Germany	164,010,000	45,660,000	209,670,000
Spain	78,370,000	126,655,000	205,025,000
Netherlands	38,264,000	22,261,500	60,525,500
Belgium	18,013,335	9,006,665	27,020,000
Italy	183,300,000	23,000,000	206,300,000
Russia	580,710,000	25,370,000	606,080,000
Aust.-Hungary	230,210,000	60,110,000	290,320,000
Sweden	19,030,000	.....	19,030,000
Norway	7,820,000	.....	7,820,000
Switzerland	15,455,000	.....	15,455,000

The New York banks do not separate gold and silver. The foreign statements are from the *Commercial and Financial Chronicle* of New York.

Gold and silver movement, Great Britain, full year:

Gold:	1906.	1907.
Imports	£ 46,012,590	£ 57,088,547
Exports	42,617,767	50,866,009
Excess, imports	£ 3,394,823	£ 6,222,538
Silver:		
Imports	17,288,063	15,983,892
Exports	18,865,285	16,920,349
Excess, exports	£ 1,577,222	£ 936,457

Of the silver imported in 1907 the United States furnished £11,961,701, or 74.8 per cent. of the total.

Silver Market

SILVER AND STERLING EXCHANGE.

Jan.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Jan.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
23	4.8690	55¾	25 11/16	27	4.8710	55⅝	25⅝
24	4.8705	55⅝	25 5/8	28	4.8725	55⅝	25½
25	4.8700	55½	25⅝	29	4.8710	55½	25⅝

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Messrs. Pixley & Abell report silver shipments from London to the East for the year to Jan. 16:

	1907.	1908.	Changes.
India	£ 224,610	£ 265,000	I. £ 40,390
China	.....	91,000	I. 91,000
Straits	.....	.....	.....
Total	£ 224,610	£ 356,000	I. £ 131,390

Receipts for the week were £5000 from the West Indies and £176,000 from New York; £181,000 in all. Exports were £30,000 to China and £57,500 to India; £187,500 in all.

Purchases of silver for the United States Mint were: Jan. 22, 200,000 oz. at 55.826c., deliveries New Orleans and Philadelphia, Jan. 24, 100,000 oz. at 55.826c., delivery Philadelphia.

Other Metals

Jan.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
23	13¾ @14	13⅝ @13¾	62¾	27½	3.70 @3.75	4.55 @4.60	4.40 @4.45
24	13⅞ @14	13⅝ @13⅞	62¾	27½	3.70 @3.75	4.55 @4.60	4.40 @4.45
25	13⅞ @14	13⅝ @13⅞	.....	27¾	3.70 @3.75	4.55 @4.60	4.40 @4.45
27	13⅞ @14	13⅝ @13⅞	61¼	27¼	3.70 @3.75	4.55 @4.60	4.40 @4.45
28	13¾ @14	13⅝ @13¾	62	27½	3.70 @3.75	4.55 @4.60	4.40 @4.45
29	13¾ @14	13⅝ @13¾	62½	27¾	3.70 @3.75	4.55 @4.60	4.40 @4.45

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electroytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—The market has been quiet, although more or less business, both domestic and for export, has been going on from day to day. Inquiries from Europe have temporarily fallen off, however, and American manufacturers generally do not yet manifest any immediate necessity for the replenishment of supplies. Reports from them are variable, some indicating a little revival of business, while others show no improvement. Producers generally appear to be well sold for early shipment, and not pressing upon the market, but some have been offering concessions and yesterday and today have been accepting orders at slightly lower prices. The market closes quiet at 13¾@14c. for Lake and 13⅝@13¾c. for electrolytic. Casting is altogether nominal, with the average for the week 13⅜@13½c.

The market for standard copper in London has been quiet and inclined to be weak, and closed at £62 2s. 6d. for spot and £62 15s. for three months. Refined and manufactured sorts we quote: English tough, £58@59; best selected, £66@67; strong sheets, £69@70.

Exports from New York and Philadelphia for the week were 2677 tons. Exports from Baltimore are given by our special correspondent at 1375 long tons.

According to reliable advices from Europe, the approximate quantities of copper now lying in warehouse at London, Liverpool, Newcastle and Havre are 31,000,000 lb., of which about 22,000,000 lb. is American Lake and electrolytic.

Copper Sheets and Wire—The base price of sheets 20c.; wire, 16¼@16½c. per pound.

Tin—Toward the end of last week the London market showed a very strong tendency and advanced to £125 7s. 6d. for spot and £126 for three months. It had the beginning of this week again become reactionary and closed strong at £124 5s. for spot and £125 for futures.

There was a good deal of inquiry among consumers in this market, but business transacted was of a retail character and for spot delivery only. Supplies are becoming smaller and in consequence thereof the premium for spot is still maintained. Quotations at the close are 27¾c.

Lead—There has been a little business doing from day to day at last prices, 3.70@3.75c. New York, but on the whole the market has been rather lifeless. The London market became quite strong toward the end of this week, and Spanish lead advanced to £15 and English to £15 2s. 6d.

Spelter—The market is very quiet and consumption of the metal is greatly reduced. There is little inquiry for the metal, and that in the hands of speculators has been offered for sale at lower prices, but few transactions are reported. The close is barely steady at 4.55@4.60c. New York and 4.40@4.45c. St. Louis. The London market has not maintained the advance which it scored last week and closes 5s. lower, at £20 17s. 6d. for good ordinaries and £21 17s. 6d. for specials.

Zinc Sheets—The base price is $7 per 100 lb.—less discount of 8 per cent.—f.o.b. cars at Lasalle and Peru. The freight rate to New York is 27.50c. per 100 lb.

Antimony—The market for spot delivery is quiet and prices have declined slightly for all brands. A good feeling

prevails regarding futures and the foreign markets display considerable strength. Quotations are: 9½c. for Cookson's; 9c. for Hallett's; 8¼@8½c. for ordinary brands.

Aluminum—The present price is 33c. per lb. for No. 1 ingots.

Cadmium—The price is $1.25 f.o.b. Cleveland in 100-lb. lots. A higher price is asked for smaller lots.

Nickel—For large lots, New York, the chief producer quotes 45@50c. per lb. according to size and terms of order. For small quantities, 50@65c., same delivery.

Quicksilver—New York quotations are $45 per flask for lots of 100 flasks or over, and $46 for smaller orders. San Francisco quotations are $44.50@45.50 for domestic orders; for export nominal, at about $1.50 lower. The London price is £8 5s. per flask, with £8 3s. 9d. quoted from second hands.

Platinum—The market is featureless and not much business is being done. Prices are unchanged as follows: Hard platinum, $28; ordinary, $25.50; scrap, $17 @18 per Troy ounce.

Wisconsin Ore Market

Platteville, Wis., Jan. 25—The base price for 60 per cent. zinc ore the first of the week was $38 per ton but later climbed to $40 per ton. The highest price paid was $40. Under the stimulus of better prices several producers resumed operations during the week. The Joplin Separator Works at Galena, Ill., are again in the field, buying low-grade raw concentrates and re-selling to the smelters the product dressed by roasting and magnetic separation. The company building the Blake-Huff electrostatic separator, now nearing completion at Platteville, will also enter the competitive buying field for blende ores. With an open market assured for lower grades of concentrates, many mines will resume.

A price of $22 per thousand was the basis offered for 80 per cent. lead ore. One car was sold on this basis, but no shipments are reported.

Shipments for the week ended Jan. 25 were:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville	389,770	.....	.....
Hazel Green	157,200	.....	.....
Livingston	140,000	.....	.....
Harker	63,610	.....	.....
Linden	60,000	.....	.....
Rewey	34,000	.....	.....
Total	844,580	.....	.....
Year to Jan. 25	4,070,860	.....	.....

Other camps made no shipments.

Missouri Ore Market

Joplin, Mo., Jan. 25—The highest price paid for zinc ore was $44, on a base price of $39@41 per ton of 60 per cent. zinc, averaging, all grades, $36.82, a decrease of $1 per ton, occasioned by the large increase in silicate shipments. The highest price paid for lead ore was $50.50 per ton delivered, with medium grades selling at $47@49, and all grades averaging $47.72 per ton.

The increased zinc shipment of the week is the result of the active competition for all grades of sulphide and silicate ores, which practically takes up all the ore for sale at present prices. The output of the week was increased approximately 800 tons by the re-starting of mills that have been idle, the shipment representing the output.

Following are the shipments from the various camps for the week ending Jan. 25:

	Zinc, lb.	Lead, lb.	Value.
Joplin	1,896,900	187,410	$42,482
Webb City-Carterville	1,777,330	175,540	38,869
Galena	681,600	76,900	14,113
Badger	552,940	.....	11,329
Alba-Neck	509,900	.....	10,442
Prosperity	367,930	95,930	9,476
Aurora	564,930	7,410	9,169
Duenweg	412,050	29,040	8,730
Oronogo	412,850	7,100	8,253
Spurgeon	484,500	22,530	7,818
Granby	575,000	22,000	7,050
Quapaw-Baxter	244,890	48,860	5,580
Wentworth	181,200	.....	2,192
Stott City	48,250	.....	916
Totals	8,710,270	672,720	$176,419
Total January	28,462,780	3,656,960	$ 589,455
January last year	43,823,150	6,098,280	$1,237,498
Zinc value, the week,	$160,362;	the mo.,	$ 504,549
Lead value, the week,	16,057;	the mo.,	84,906

Average ore prices in the Joplin market were, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January	47.38	45.84	January	75.20	83.58
February	47.37	47.11	February	72.83	84.58
March	42.68	48.66	March	73.73	82.75
April	44.63	48.24	April	75.13	79.76
May	40.51	45.98	May	78.40	79.56
June	43.83	44.82	June	80.96	73.66
July	43.25	45.79	July	74.31	68.18
August	43.56	43.22	August	75.36	59.54
September	42.58	40.11	September	79.64	53.52
October	41.55	39.83	October	79.84	51.40
November	44.13	35.19	November	81.98	43.40
December	43.68	30.87	December	81.89	37.71
Year	43.24	43.68	Year	77.40	68.90

Chemicals

New York, Jan. 29—In nearly all branches little or no business is being done. The depression is felt keenly by the smaller houses who are having difficulties with collections.

Copper Sulphate—Business is of hand-to-mouth order and only small stocks are being sold for immediate demands. Prices are unchanged at $5.50 per 100 lb. for carloads and $5.75 for smaller lots.

Nitrate of Soda—Business is not active but the market is firmer. Quotations are: For 95 per cent., 2.42½c. for 1908 delivery; 2.40c. for 1909; and 2.37½c. for 1910. The 96 per cent. grade sells for 7½c. per 100 lb. more.

Sulphur—Pending negotiations between the Sicilian *Consorzio* and the American producers, the price of both Louisiana prime and Sicilian sulphur has been advanced to $22 per ton.

Phosphates—Shipments of phosphates through the port of Savannah in December are reported by J. M. Lang & Co. as follows, in long tons: Germany, 8810; Holland, 2614; Austria, 1967; Spain, 1511; Italy, 685; Great Britain, 300; total, 15,887 tons.

Total exports from United States, 11 months ended Nov. 30, were 900,916 tons in 1906, and 971,832 tons in 1907; increase, 70,916 tons.

Mining Stocks

New York, Jan. 29—The reaction noted last week is not yet over, and the stock markets have been irregular and confused, with small fluctuations. At the close the tendency seems to be rather stronger. American Smelting stock has been a little quieter, though there is still enough doing to cause a good deal of guessing as to the reasons for the manipulation which is evidently going on.

The curb market has been quite active, with a good demand for the copper stocks and better prices for some of them. Here also, the movement has been rather confused and irregular.

Boston

Jan. 28—There has been a gradual but hardening tendency to the mining-share market. In a few stocks there has been active speculation, but moderate reactions have followed, so that the tone is healthy. The features the past week have been Arizona Commercial, Boston Consolidated, Isle Royale, Butte Coalition, North Butte, Old Dominion and Utah Consolidated, each having a reason of its own. North Butte rose almost $2 to $51.25, and Butte Coalition over $1.50 to above $20. Amalgamated control is reported in both of these companies. Isle Royale rose $5 to $26.25 on reports of the finding of the Baltic lode. Arizona Commercial rose $3.75 to $20.75 on favorable reports from the property and excellent buying. Boston Consolidated has been favored with a $2.62½ advance to $16.87½ on the fact that the first section of the mill has gone into commission. Utah Consolidated rose $6.37½ to $41.37½. There has not been any particular news on the latter, but the buying has been aggressive. Copper Range has been quiet and firm, having aaccumulated $2.50 to $64.50. Balaklala is off a trifle to $3. The plan to take this company over by the First National Copper Company has been promulgated. Thomas W. Lawson is the president of this company.

The curb has been active, although the action of Nevada-Utah has been disappointing. Davis-Daly is up to $5.62½. Work at the latter has been resumed. Geyser is the latest curb feature, with large sales at 25 cents.

Cripple Creek

Jan. 24—A very considerable improvement has been noticeable in the mining-stock market dealing in Cripple Creek shares in the past month or two. A number of the better class stocks have advanced considerably in price due partly to a stronger market and partly to a better showing in the individual property. The amount of ore shipped from the district is greater than for some time past. More men are at work and there is quite a demand for leases. The resumption of operations of the Golden Cycle mill is principally responsible for the increased production, though the dulness in other camps in the West has had some effect.

STOCK QUOTATIONS

NEW YORK	Jan. 28
Name of Comp.	Clg.
Alaska Mine	⅜
Am. Nev. M. & P. Co.	....
Amalgamated	52
Anaconda	33
Balaklala	3
British Col. Cop.	5½
Buffalo Cobalt	....
Butte & London	1
Butte Coalition	19⅜
Butte Cop. & Zinc.	....
Cobalt Contact	....
Colonial Silver	¾
Cum. Ely Mining.	8
Davis Daly	5½
Dominion Cop.	2 7/16
El Rayo	1⅝
Foster Cobalt	.65
Furnace Creek	.37
Giroux Mine	4
Gold Hill	1
Granby, New	....
Greene Gold	1
Greene G. & S	¾
Greenw'r & D. Val.	....
Guanajuato	2¾
Guggen. Exp.	145
Hanapah	....
McKinley Dar.	1 1/16
Micmac	4½
Mines Co. of Am.	1⅝
Mitchell Mining.	¾
Mont. Sho. C. (New)	3¼
Nev. Utah M. & S	5½
Newhouse M. & S.	9¼
Nipissing Mines	7⅛
Old Hundred	⅞
Silver Queen	1 1/16
Stewart	1 1/16
Tennessee Cop'r.	29¾
Union Copper New	1⅛
Utah Apex	3⅛
West Columbus	....

N. Y. INDUSTRIAL	
Am. Agri. Chem.	16
Am. Smelt. & Ref.	67¼
Am. Sm. & Ref., pf.	91⅜
Bethlehem Steel	....
Colo. Fuel & Iron	20¼
Federal M. & S., pf.	66
Inter. Salt	....
National Lead	39⅛
National Lead, pf.	90¾
Pittsburg Coal	9⅛
Republic I. & S.	17⅛
Republic I. & S., pf.	....
Sloss-Sheffield	40¾
Standard Oil	488
Tenn. C. & I.	....
U. S. Red. & Ref.	....
U. S. Steel	28¾
U. S. Steel, pf	92¾
Va. Car. Chem	18
Va. I. Coal & Coke	53

ST. LOUIS	Jan. 25		
N. of Com.	High.	Low.	
Adams	.25	.20	
Am. Nettie	.03	.02	
Center Cr'k	2.00	1.50	
Cent. C. & C.	65.00	63.00	
C.C. & C. pd.	75.00	74.00	
Cent. Oil	100.00	90.00	
Columbia	4.00	2.50	
Con. Coal	24.00	22.00	
Doe Run	115.00	110.00	
Gra. Bimet.	.25	.20	
St. Joe	12.00	11.00	

BOSTON	Jan. 28
Name of Comp.	Clg.
Adventure	2¾
Allouez	32¼
Am. Zinc	....
Arcadian	....
Atlantic	5¼
Bingham	13
Boston Con	6¼
Calumet & Ariz.	16½
Calumet & Hecla.	113¾
Centennial	27⅞
Con. Mercur	....
Copper Range	64
Daly West	9½
Franklin	10¼
Greene-Can.	9
Isle Royal	25¾
La Salle	16
Mass	4
Michigan	12¾
Mohawk	55½
Mont. C. & C. (new)	1¼
Nevada	11
North Butte	50½
Old Colony	.55
Old Dominion	38¾
Osceola	89
Parrot	14
Phoenix	....
Quincy	90
Rhode Island	4⅛
Santa Fe	2⅜
Shannon	13
Tamarack	....
Trinity	16¼
United Cop., com.	7⅞
U. S. Oil	....
U. S. Smg. & Ref.	33½
U.S.Sm. & Re., pd.	39¾
Utah Copper	40¾
Victoria	5½
Washington	....
Winona	5⅞
Wolverine	....
Wyandotte	....

*Ex. Div. †Ex. Rights.

BOSTON CURB	
Ahmeek	....
Ariz. Com	....
Black Mt.	4⅝
East Butte	6¾
Hancock Con.	....
Keweenaw	5⅞
Majestic	1⅜
Raven	1⅜
Shawmut	.38
Superior	19
Superior & Pitts	14¼
Troy Man	....

LONDON	Jan. 29		
Name of Com.	Clg.		
	£1	8s	9d
Dolores	0	3	9
Stratton's Ind.	0	15	9
Camp Bird	1	8	9
Esperanza	1	7	6
Tomboy	1	0	0
El Oro	0	12	3
Oroville	...	...	.
Somera	...	...	.
Utah Apex	...	...	.
Ariz. Cop., pfd.	...	...	.
Ariz. Cop., def.	...	...	.

Cabled through Wm. P. Bonbright & Co., N.Y.

NEVADA STOCKS. Jan. 29. Furnished by Weir Bros. & Co., New York.			
Name of Comp.	Clg.	Name of Comp.	Clg.
TONOPAH STOCKS		Golden Sceptre	...
Belmont	1.00	Homestake King.	.60
Extension	1.50	Montgomery Mt.	.18
Golden Anchor	.06	Mont. Shoshone C.	3.50
Jim Butler	.42	Original Bullfrog.	.06
MacNamara	.46	Tramp Cons	.19
Midway	.80	MANHAT'N STOCKS	
Montana	1.90	Manhattan Cons.	.22
North Star	.17	Manhat'n Dexter.	.08
Tonopah & Cal.	....	Jumping Jack	.07
Tono'h Mine of N.	5.12½	Stray Dog	.10
West End Con	.35	Indian Camp	.06
GOLDFI'D STOCKS		GREENW'R STOCKS	
Adams	.10	Furnace Creek	...
Atlanta	.40	Greenwater & D.V.	...
Blue Bell	.13	Green'rCop.M. & S.	...
Blue Bull	.20	United Greenwa'r	...
Booth	.20	MISCELLANEOUS	
Columbia Mt.	.23	Golden Boulder	.12
Comb. Frac	.88	Hayseed	.30
Cracker Jack	.13	Lee Gold Grotto	.11
Dia'dfield B. B. C.	.24	Nevada Hills	3.25
Goldfield Belmont	.14	Nevada Smelting.	1.50
Goldfield Con	5.66½	Pittsburgh S. Pk.	1.35
Goldfield Daisy	1.16	Round Mt. Sphinx	.30
Goldfield Mining.	...		
Great Bend	.25		
Jumbo Extension	.60		
Jumbo Mining	...		
Katherine	.06		
Kendall	.23		
Laguna	...		
Lone Star	.12		
Lou Dillon	...		
May Queen	.08		
Mohawk	...		
Oro	.16		
Red Hill	.41		
Red Top	...		
Roanoke	.07		
Sandstorm	.30		
Silver Pick	.37		
St. Ives	.55		
Triangle	.09		
BULLFROG STOCKS			
Amethyst	...		
Bullfrog Daisy	...		
Bullfrog Mining	.08		
Bullfrog Nat. B.	.12		
Gibraltar	.12		
Gold Bar	.40		

COLO. SPRINGS	Jan. 25		
Name of Comp.	Clg.		
Acacia	7¾		
Black Bell	....		
C. C. Con	4¾		
Dante	8⅝		
Doctor Jack Pot	7		
Elkton	53		
El Paso	28		
Findlay	37		
Gold Dollar	7		
Gold Sovereign	4		
Isabella	35½		
Index	....		
Jennie Sample	4		
Jerry Johnson	9		
Mary McKinney	43		
Pharmacist	4½		
Portland	1.00		
Un. Gold Mines	6		
Vindicator	....		
Work	16		

Assessments

Company.	Delinq.	Sale.	Amt.
Banner Hill, Cal	Jan. 6	Jan. 27	$0.10
Belcher, Nev	Jan. 3	Jan. 31	0.10
Bullion, Nev	Jan. 3	Jan. 27	0.05
Champion, Cal	Jan. 2	Jan. 23	0.50
Chollar, Nev	Dec. 27	Jan. 20	0.10
Confidence, Nev	Jan. 3	Jan. 24	0.20
East Tintic, Utah	Jan. 14	Feb. 9	0.01
Imlay, Nev	Jan. 24	Feb. 10	0.01
Lady Washington, Nev	Jan. 9	Jan. 30	0.05
Lucky Dutchman, Nev	Jan. 16	Feb. 8	0.01
Moduff, Utah	Jan. 3	Feb. 4	0.01
Nevada Superior, Nev	Jan. 24	Feb. 21	0.05
New Stockton, Utah	Dec. 23	Jan. 20	0.02½
N. Y. Bonanza, Utah	Jan. 4	Jan. 25	0.03
Penn. Con., Cal	Jan. 13	Jan. 29	0.10
Posey Canyon, Utah	Jan. 7	Jan. 25	0.01
Spanish Ridge, Cal	Jan. 15	Feb. 5	0.02
Sunflower, Cal	Jan. 30	Mar. 30	0.05
Wabash, Utah	Jan. 17	Feb. 8	0.12
Zeibright, Cal	Jan. 6	Feb. 1	0.05

New Dividends

Company.	Payable.	Rate.	Amt.
Alaska Mexican	Jan. 28	$0.50	$90,000
Alaska Treadwell	Jan. 28	0.75	150,000
Alaska United	Jan. 28	0.15	27,030
Amalgamated	Feb. 24	0.50	765,440
Am. Cement	Jan. 23	0.30	60,000
Anaconda	Jan. 15	0.50	600,000
Boston & Montana	Feb.	3.00	450,000
Cambria Steel	Feb. 15	0.75	450,000
Camp Bird, Ltd	Feb. 3	0.24	246,800
Consolidation Coal	Jan. 31	3.50	358,750
Doe Run	Jan. 15	0.50	29,531
El Oro	Jan. 15	0.36	388,800
Fairmont Coal	Jan. 31	2.00	240,000
Florence	Jan.	0.10	105,000
Francis-Mohawk	Jan.	0.05	45,500
Georges Creek C. & I	Jan. 22	2.50	55,000
Homestake	Jan. 25	0.50	109,200
Jamison	Jan. 18	0.02	7,800
Jeff. & Cl'f. C. & I., pfd.	Feb. 15	2.50	37,500
Jerry Johnson	Jan. 15	0.01	25,000
Montezuma M. & S.	Jan. 10	0.04	40,000
N. Y. Hond. Rosario	Jan. 25	0.10	15,000
Portland	Jan. 15	0.04	120,000
Tenn. Copper Co.	Feb. 15	1.25	218,750
Vindicator Con.	Jan. 25	0.04	60,000

Monthly Average Prices of Metals

AVERAGE PRICE OF SILVER

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	65.288	68.673	30.113	31.769
February	66.108	68.835	30.464	31.862
March	64.597	67.519	29.854	31.325
April	64.765	65.462	29.984	30.253
May	66.976	65.981	30.968	30.471
June	65.394	67.090	30.185	30.898
July	65.105	68.144	30.113	31.366
August	65.949	68.745	30.529	31.637
September	67.927	67.792	31.483	31.313
October	69.523	62.436	32.148	28.863
November	70.813	58.677	32.671	27.154
December	69.050	54.565	32.003	25.362
Year	66.791	65.327	30.868	30.188

New York, cents per fine ounce; London, pence per standard ounce.

AVERAGE PRICES OF COPPER

	NEW YORK.				LONDON.	
	Electrolytic		Lake.			
	1906.	1907.	1906.	1907.	1906.	1907.
January	18.310	24.404	18.419	24.825	78.869	106.739
February	17.869	24.869	18.116	25.236	78.147	107.366
March	18.361	25.065	18.641	25.560	81.111	106.594
April	18.375	24.224	18.688	25.260	84.793	98.625
May	18.475	24.048	18.724	25.072	84.867	102.375
June	18.442	22.665	18.719	24.140	83.994	97.272
July	18.190	21.130	18.585	21.923	81.167	95.016
August	18.380	18.356	18.706	19.255	83.864	79.679
September	19.033	15.565	19.328	16.047	87.831	68.375
October	21.203	13.169	21.722	13.551	97.269	60.717
November	21.833	13.391	22.398	13.870	100.270	61.226
December	22.885	13.163	23.350	13.393	105.226	60.113
Year	19.278	20.004	19.616	20.661	87.282	87.007

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

AVERAGE PRICE OF TIN AT NEW YORK

Month.	1906.	1907.	Month.	1906.	1907.
January	36.390	41.548	July	37.275	41.091
February	36.403	42.102	August	40.606	37.667
March	36.662	41.313	September	40.516	36.689
April	38.900	40.938	October	42.852	32.620
May	43.313	43.149	November	42.906	30.833
June	39.260	42.120	December	42.750	27.925
			Av. year	39.819	38.166

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	5.600	6.000	16.850	19.828
February	5.464	6.000	16.031	19.531
March	5.350	6.000	15.922	19.703
April	5.404	6.000	15.959	19.975
May	5.685	6.000	16.725	19.688
June	5.750	5.760	16.813	20.188
July	5.750	5.288	16.525	20.350
August	5.750	5.250	17.109	19.063
September	5.750	4.813	18.266	19.775
October	5.750	4.750	19.350	18.531
November	5.750	4.376	19.281	17.281
December	5.900	3.658	19.609	14.500
Year	5.657	5.325	17.370	19.034

New York, cents per pound. London, pounds sterling per long ton.

AVERAGE PRICE OF SPELTER

MONTH.	New York.		St. Louis.		London.	
	1906.	1907.	1906.	1907.	1906.	1907.
January	6.487	6.732	6.337	6.582	28.225	27.125
February	6.075	6.814	5.924	6.664	25.844	25.938
March	6.209	6.837	6.056	6.687	24.563	26.094
April	6.087	6.685	5.931	6.535	25.781	25.900
May	5.997	6.441	5.846	6.291	27.000	25.563
June	6.096	6.419	5.948	6.269	27.728	25.469
July	6.006	6.072	5.856	5.922	26.800	23.850
August	6.027	5.701	5.878	5.551	26.938	21.969
September	6.216	5.236	6.056	5.086	27.563	21.060
October	6.222	5.430	6.070	5.280	28.075	21.781
November	6.375	4.925	6.225	4.775	27.781	21.438
December	6.593	4.254	6.443	4.104	27.938	20.075
Year	6.198	5.962	6.048	5.812	27.020	23.771

New York and St. Louis, cents per pound. London in pounds sterling per long ton.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

ABRASIVES—		
Bort, good drill quality, carat		$85.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10@.17
Corundum	"	.07@.10
Crushed Steel, f.o.b. Pittsburg	"	.05¾@.06
Emery, in kegs: Turkish flour	"	.01½@.02½
Grains	"	.03½@.04½
Naxos flour	"	.01½@.02½
Grains	"	.03½@.04½
Chester flour	"	.01½
Grains	"	.03½@.04½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½@.01½
Grains, in kegs	"	.02½@.02½
Garnet, per quality	ton	25.00@35.00
PumiceStone, Am. Powd.	100 lb.	1.60@2.00
Italian, powdered	"	.01¼@.01½
Lump, per quality	"	.08@.20
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.05@.25
Rouge, per quality	"	.05@.30
Steel Emery, f.o.b. Pittsburg	"	.07¼@.07¾
ACIDS—		
Acetic 28%	lb.	.020@.03
Boric	"	.08@.08¼
Hydrofluoric, 30%	"	.02¾@.03
" 48%	"	.06
" 60%	"	.10
Hydrochloric acid, 20°, per lb		1.25@1.50
Nitric acid, 38°	per lb.	4.25@4.62½c.
Sulphuric acid, 50°, bulk, per ton		$12 up.
60°, 100 lb. in carboys		.85@1.12½
60°, bulk, ton		16.00@18.00
66°, 100 lb. in carboys		1.00@1.25
66°, bulk, ton		18 00
Oxalic	"	.07@.07¼
ALCOHOL—Grain 95%	gal.	2.59
Denatured		.40@.45
Refined wood, 95@97%	"	.40@.45
ALUM—Lump	100 lb.	$1.75
Ground	"	1.85
Chrome Alum	lb.	.05½@ 06
ALUMINUM—Sulphate, com'l	"	1.25@1.75
AMMONIA—24 deg.	lb.	.04½@.05¾
" 26 " "		.04¾@.05¾
AMMONIUM—		
Bromide	lb.	.28
Carbonate	"	.07¾@.08
Muriate grain	"	.05¾@.06¼
Lump	"	.09½@.09¾
Sulphate, 100 lb.	"	3.05@3.10
Sulphocyanide com.	"	.30
" " chem. pure	"	.40
ANTIMONY—needle, lump	lb.	.05@ 06½
ARSENIC—White	"	.04½@.05
Red	"	.07½@.07¾
ASPHALTUM—		
Barbadoes	per ton.	40.00@80.00
West Indies	"	20.00@60.00
Egyptian	lb.	.12@.14
Gilsonite, Utah ordinary	per ton.	35.00
Trinidad	"	28.00@30.00
California	"	21.00@27.00
BARIUM—		
Carb. Lump, 80@90%	lg. ton.	30.00@35.00
Precipitated 96@98%		31.50@35.00
Powdered, 80@90%	lb.	.02@.02½
Chloride com'l	ton.	38.00@40 00
Nitrate, powdered, in casks	lb.	.05½@.06
Blanc Fixe	per lb.	.02¾
BARYTES—		
Am. Ground	sh. ton.	14.00@21.00
Floated	"	22.00
Foreign floated	"	19.50@22.50
BISMUTH—Sub-nitrate	lb.	1.50
BLEACHING POWDER—35%,	100 lb.	1.25@1.40
BLUE VITRIOL—(copper sulphate), carload, per 100 lb		5.50
BONE ASH	lb.	.02½@.04
BORAX	"	.04½@.05½
CALCIUM—Acetate, gray	"	2.25@2.30
Acetate, brown	"	1.40@1.45
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. N. Y.	"	14.75@19.75
CEMENT—		
Portland, Am. 500 lb.	bbl.	1.55@1.60
Foreign	"	2.25@2.90
"Rosendale," 300 lb.	"	.85
(in sacks)		.65
Slag cement	"	.75@1.25
CHROME ORE—		
New Caledonia 50% ex. ship N. Y.	per lg. ton	17.50@20.00
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	8.50@9.00
Foreign	"	10.00@17.50
COBALT—Oxide	lb.	2.50
COPPERAS—Bulk	100 lb.	$0.55
In bbls	"	.65@.75
In bags	"	.60@.70
CRYOLITE	lb.	.06½@.06¾
FELDSPAR—Ground best	sh. ton.	10.50@15.00
FIRE BRICK—		
American	per M.	30.00@40.00
Imported	"	30.00@45.00
St. Louis No. 1	"	18.00
" No. 2	"	15.00
Extra	"	20.00@23.00
FIRE CLAY—F. o. b. St. Louis.		
St. Louis, extra quality	per ton	5.00
" ordinary	"	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	lg. ton.	8.00@10.00
Ground	"	11.50@13.50
Foreign crude ex. dock		8.00@10.00
FULLER'S EARTH—Lump,	100 lb.	.75@.85
Powdered	"	.75@.85
GRAPHITE—Ceylon		
Flying dust, finest to best	lb.	.01@.04
Dust	"	.01¾@.05
Chip	"	.02¾@.07¼
Lump	"	.04@ 10
Large lump	"	.07@.10
GYPSUM—		
Fertilizer	sh. ton.	7.00
Powdered	sh. ton.	12.00@20.00
INFUSORIAL EARTH—		
Ground Am. best	lb.	.01¾
French	lg. ton.	55.00
German	lb.	.02½@.02¾
LEAD—Acetate (sugar of) brown	lb.	.07¾
Nitrate, com'l	"	.08½@.09¼
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	8.00@10.00
Calcined, powdered	sh. ton.	30.00@40.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	100 lb.	.80@1.00
Sulphate (Epsom salt)	100 lb.	.90@1.00
MANGANESE—		
Foreign, crude, powdered:		
70@75% binoxide	lb.	.01@.01¼
75@85% binoxide	"	.01¼@.01¾
85@90% binoxide	"	.01¾@.05
90@95% binoxide	"	.06½
Ore, 80%-85%	sh. ton.	20.00@50.00
MARBLE—Flour	sh. ton.	9.50@10.00
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide, nominal	lb.	.08 and up.
NICKEL—		
Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb,	.09@.11
" double	"	.06½@.08
NITRATE OF SODA—100 lb. 95% for '07		2.45
95% for 1908		2.45@2.50
95% for 1909		2.40
96% is 5c higher per 100 lb.		
OZOKERITE—best	lb.	.14@.17
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.06½@.06¾
English glassmakers'	"	.08½@.08½
Lithopone	"	.03½@.07
Metallic, brown	sh. ton.	16.50@22.00
Red	"	14.00 @18.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01½@.02½
Paris green, pure, bulk	"	.26
Red lead, American	"	.06½@.06¾
Foreign	"	.08½@.08½
Turpentine, spirits bbl., per gal.		.44½@.45
White lead, Am., dry	lb.	.05½@.06
American, in oil	"	.06½@.06¾
Foreign, in oil	"	.10½@.10¾
Zinc white, Am. extra dry	"	.05½@.05¾
French, red seal, dry	"	.08½@.08¾
" Green seal, dry	"	.10½@.10¾
PHOSPHATES—Acid		65@70c per unit
*Fla., hard rock		10.25@10.50
land pebble 68%		5.25@5.50
†Tenn., 78@80%		7.00@8.00
75%		6.25@6.75
68@72%		5.25@5.50
‡So. Car. land rock		6.75@7.00
" " river rock		7.00@7.25
POTASSIUM—		
Bicarbonate crystal	lb.	$.08½@.09
Powdered or granulated	"	.09@.09½
Bichromate, Am.	"	.08½@.09
Scotch	"	.10¾
Bromide	"	.15@.17
Carbonate (80@85%)	"	.03½@ 04
Caustic, ordinary	"	.04½@0.5½
Elect. (90%)	"	.05½@.06
Chloride (muriate), 100 lb.		1 90
Chlorate, powdered	"	.09½@.09¾
Crystals	"	09@09½
Cyanide (98@99%)		
Carloads (30,000 lb.)	"	18c.
5-ton lots	"	18½c.
Less than 5 tons	"	19c.
Kainite, long ton, bulk, 8.50; bags, 9.50.		
Permanganate	lb.	.09½@.10
Prussiate, yellow	"	.15@.16
Red	"	.33@.38
Sulphate	100 lb.	2.18½@2.21½
PYRITE—		
Domestic, non-arsenical, furnace size, f.o.b. mines	per unit	11@11½c.
Domestic, non-arsenical, fines, per unit, f.o.b. mines		10@10½c.
Imported non-arsenical, furnace size, per unit		.13@.13½
Imported, arsenical, furnace size, per unit		.12@.13
Imported fines, arsenical, per unit.		.08½@.09
" " non-arsenical, per unit		10½@11c.

Pyrite prices are per unit of sulphur. An allowance of 25c. per ton is made when delivered in lump form.

SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.18
N. Y. agricultural	sh. ton.	3.80@4.50
SALTPETER—Crude	100 lb.	4.50@5.00
Refined, crystals	"	5.25@5.75
SILICA—		
Ground quartz, ord'ry	lg. ton	13.00@15.00
Silex	"	13.00@40.00
Lump Quartz	"	5.00@6.00
Glass sand	"	2.75
SILVER—Nitrate, crystals	oz.	.40@.42
SODIUM—		
Acetate	lb.	.04¼@.04¾
"Alkali," per 100 lb., 58/48		.80@.87½
Bicarb. soda, per 100 lb		1.20@1.50c.
Soda, caustic, per 100 lb., 76/60		1.75@1.85
" " powdered		.02¾@.03½
Salt cake, per 100 lb		.55@.70
Soda, monohydrate, per lb		1.4@1.75c.
Bichromate	lb.	.07½@.07½
Bromide	"	.15@.17
Chlorate, com'l	"	.09@.09½
Cyanide ("100% KCN")		
Carloads (30,000 lb.)	"	18c.
5-ton lots	"	18½c.
Less than 5 tons	"	19c.
Hyposulphite, Am.	"	1.35 up
German	"	1.60@1.70
Phosphate	100 lb.	2.10@2.30
Prussiate	"	.09½@.10
Sal soda, f.o.b. N. Y	100 lb.	.65@.70
Foreign, f.o.b. N. Y.	"	.80@1.00
Silicate, com'l	100 lb.	.80@1.15
Sulphate, com'l, (Glauber's salt)	100 lb.	.50@.70
" " calcined		.65@.85
STRONTIUM—Nitrate	lb.	.08@.08½
SULPHUR—		
Louisiana (prime) to New York, Boston or Portland	lg. ton	22 00
To Philadelphia or Baltimore	"	22.00
Roll	100 lb.	1.85@2.15
Flour	" "	2.00@2 40
Flowers, sublimed	" "	2.20@2.60
TERRA ALBA—French & Eng.	100 lb.	.75@1.00
TALC—Domestic	sh. ton.	15.00@25.00
French	"	16.00@25.00
Italian, best	"	35.00@40.00
TIN—Bi-chloride, 50%	lb.	.08½@ 08¾
Crystals	"	19 up
Oxide, lb		.37@.39
URANIUM—Oxide	"	3.50
ZINC—		
Chloride solution, com'l 20°	"	.02½
Chloride, granular	"	.04½@.05
Dust	"	.05½@.06
Sulphate	"	.02½@.02½

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

NOTE—These quotations are for ordinary wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. In the cases of some of the important minerals, such as phosphate rock, pyrites, and sulphur, in which there are well established markets, the quotations fully represent the latter. But in the cases of some of the minor mineral products, the quotations represent what dealers ask of consumers and not what producers can realize in selling their outputs as matters of private contract.

Metal and Mining Companies—U. S.

Name of Company and Location.		Author-ized Capital	Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1,000,000	180,000	$ 5	$1,806,381	Jan. 1908	$ .50
Alaska Treadwell, g.	Al'ka	5,000,000	200,000	25	9,785,000	Jan. 1908	.75
Alaska United, g.	Al'ka	1,000,000	180,200	5	333,370	Jan. 1908	.15
Amalgamated, c,.	Mont	155,000,000	1,530,379	100	55,942,865	Feb. 1908	.50
Am.Sm.&Ref.,com.	U. S.	50,000,000	500,000	100	12,625,000	Jan. 1908	2.00
Am. Sm. & Ref. pf.	U. S.	50,000,000	500,000	100	26,213,053	Jan. 1908	1.75
Am. Smelters, pf. A	U. S.	17,000,000	170,000	100	2,195,000	Dec. 1907	1.50
Am. Smelters. pf. B	U. S.	30,000,000	300,000	100	3,750,000	Dec. 1907	1.25
Am.Zinc,Lead&Sm.	Kan.	3,750,000	80,000	25	100,000	Nov. 1907	.50
Anaconda,c.	Mont	30,000,000	1,200,000	25	39,050,000	Jan. 1908	.50
Arizona, c.	Ariz	3,775,000	3,682,520	.....	6,182,361	Apr. 1906	.05
Atlantic, c	Mich	2,500,000	100,000	25	990,000	Feb. 1905	.02
Bald Butte, g. s.	Mont	250,000	250,000	1	1,354,648	Oct. 1907	.04
Beck Tunnel, g.s.l.	Utah	100,000	1,000,000	0.10	615,000	Oct. 1907	.02
Bingham & N.H., c.g	Utah	2,000,000	226,000	5	22,600	Sept. 1906	.10
Boston & Montana.	Mont	3,750,000	150,000	25	49 225 000	Feb. 1908	3.00
Bull.Beck.&Cham.g	Utah	1,000,000	100,000	10	2,688,400	Apr. 1907	.10
Bunker Hill & Sull.	Ida	3,000,000	300,000	10	9,876,000	Jan. 1908	.20
Butte Coalition,c.s.	Mont	15,000,000	1,000,000	15	2,450,000	Dec. 1907	.15
Calumet & Arizonac	Ariz	2,500,000	200,000	10	9,300 000	Dec. 1907	1.50
Calumet & Hecla,c.	Mich	2,500,000	100,000	25	105,900,000	Dec. 1907	10.00
Camp Bird, g., s.	Colo	5,500,000	220,000	5	4,473,100	Feb. 1908	.24
Carisa, c.g.	Utah	500,000	500,000	1	55,000	Nov. 1906	.01
Central Eureka, g.	Cal	400,000	398,425	1	778,921	Mar. 1906	.07
Columbus Con. c.	Utah	1,500,000	283,540	5	226,832	Oct. 1907	.20
Combi'tion Co.G'f'd	Nevada	400,000	320,000	1	688,000	Sept. 1906	.15
Con. Mercur, g.	Utah	1,000,000	1,000,000	1	1,205,000	Dec. 1906	.02½
Continental, z.l.	Mo	550,000	22,000	25	220,000	Oct. 1907	.50
Copper Range Con.	Mich	38,500,000	383.781	100	6,477,801	Jan. 1908	1.00
Creede United, g.	Colo	2,000,000	1,625,000	1	214 063	July 1906	.00½
Daly Judge, g. s. l.	Utah	300,000	300,000	1	225,000	Apr. 1907	.37½
Daly West, g. s. l.	Utah	3,600,000	180,000	20	5,877,000	Dec. 1907	.30
De Lamar, g. s.	Ida	400,000	67,180	5	2,926,370	May 1905	.72
Dillon, g.	Colo	1,250,000	1,250,000	1	21,875	July 1905	.01
Doctor Jack Pot.	Colo	3,000,000	3,000,000	1	268,000	July 1906	.00½
Doe Run, l.	Mo	10,000,000	59,062	100	1,523,630	Jan. 1908	.50
Elkton Con., g.	Colo	3,000,000	2,500,000	1	1,966,960	Jan. 1908	.00½
El Paso, g.	Colo	2,500,000	2,450,000	1	1,022,750	June 1906	.01
Fed. Sm., com.	Idaho	10,000,000	60,000	100	2,618,750	Dec. 1907	1.50
Federal Sm., pf.	Idaho	20,000,000	120,000	100	3,281,250	Dec. 1907	1.75
Findley, g.	Colo	1,250,000	1,250,000	1	325,000	Aug. 1906	.01
Florence, g.	Nevada	1,250,000	1,050,000	1	105,000	Jan. 1908	.10
Frances-Mohawk,g	Nevada	1,000,000	910,000	1	410,000	Jan. 1908	.05
Gemini-Keystone	Utah	500,000	5,000	100	1,950 000	July 1907	10.00
Gold King Con	Colo	5,750.370	5,750.370	1	1.407 504	May 1905	.01
Goldfield Con., g.	Nevada	50,000,000	5,000,000	10	1,000,000	Nov. 1907	.10
Grand Central, g.	Utah	250,000	250,000	1	1,333,000	Oct. 1907	.05
Gwin Mine, Dev., g.	Cal	1,000,000	100,000	10	35,000	Mar. 1906	.25
Hecla, s. l.	Idaho	250,000	1,000,000	0.25	1,460,000	Dec. 1907	.02
Homestake, g.	S. D.	21,840,000	218,400	100	22,313,240	Jan. 1908	.50
HornSilver,g.s.c.z.l	Utah	10,000,000	400,000	25	5,642,000	sept. 1907	.05
Inter'l Nickel, pf.	N. Y.	12,000,000	87,415	100	1,048,992	Feb. 1908	1.50
Iron Silver	Colo	10,000,000	500,000	20	4,100,000	Oct. 1907	.10
Jamison, g.	Cal	3,900 000	390,000	10	294,070	Jan. 1908	.02
Jerry Johnson,	Cal	2,500,000	2,500,000	1	86,700	Jan. 1908	.01
Kendall, g.	Mont	2,500,000	500 000	5	1,130,000	Aug. 1907	.02
Liberty Bell,g. s.	Colo	700,000	130,551	5	110,857	Jan. 1906	.15
Lightner, g.	Cal	125,000	102,255	1	295.694	Aug. 1905	.05
Lower Mammoth, g	Utah	190,000	190,000	1	42,750	Aug. 1907	.07½
Mammoth, g. s. l.	Utah	10,000 000	400,000	2.50	2,140,000	Dec. 1907	.05
Mary McKinney, g.	Colo	1,500,000	1,304,252	1	801.765	Apr. 1907	.03
May Day, g. s. l.	Utah	800,000	800,000	1	70,010	Oct. 1907	.01½
Mohawk, c.	Mich	2,500,000	100,000	25	1,400,000	July 1907	5.00
Mont. Ore Purch.	Mont	2,500,000	80,833	25	9,437,274	Jan. 1907	15.00
Nevada Hills, s.g.	Nevada	1,000,000	200,000	5	300,000	Sept. 1907	.10
New Century, z., l.	Mo	300,000	300,000	1	230,300	Aug. 1907	.00½
Newhouse M. & S.c.	Utah	6,000,000	600,000	10	600,000	Nov. 1907	.50
New Idria, q	Cal	500 000	100,000	5	960,000	Jan. 1908	.20
New Jersey Zinc	U. S.	10,000,000	100,000	100	8.400,000	Feb. 1906	3.00
North Butte	Mont	6,000,000	400,000	15	5,800,000	Sept. 1907	2.00
North Star, g.	Cal	2,500,000	250,000	10	1,636,989	Dec. 1907	.20
Old Dominion Cop.	Ariz	7,500,000	281,589	25	280,843	May 1906	.50
Old Gold	Colo	2,101,150	2,101,150	1	10,506	Mar. 1906	.05
Ophir, g. s.	Nevada	202,400	100,800	2	1,797,400	July 1904	.25
Osceola, c.	Mich	2,500,000	96,150	25	7,035.650	July 1907	7.00
Parrot, c.s.	Mont	2,300,000	229,850	10	6,807,649	Sept. 1907	.25
Pennsylvania g.	Cal	5,150,000	51,500	100	284,925	July 1905	.10
Pitts. L. & Z., l.z.	Mo	1,000,000	1,000,000	1	20,000	July 1907	.02
Portland, g.	Colo	3,000,000	3,000,000	1	7,747,080	Jan. 1908	.04
Quartette, g. s.	Nevada	1,000,000	100,000	10	375,000	July 1907	.20
Quincy, c	Mich	3,750,000	110,000	25	17,945,446	Dec. 1907	2.00
Rocco Homest'k,l.s.	Nevada	300,000	300,000	1	112.000	Dec. 1905	.02
Sacramento, g, q.	Utah	1,000,000	1,000,000	1	258,000	Nov. 1906	.00½
St. Joseph, l.	Mo	20,000,000	1,000,000	10	5,558,357	Dec. 1907	.15
Silver Hill, g. s.	Nevada	108,000	108,000	1	81 000	June 1907	.05
Silver King, g. s. l. †	Utah	3,000,000	150,000	20	11,187,500	July 1907	.83½
Silver King Co't'n.†	Utah	6,250,000	1,250,000	5	187,500	Oct. 1907	.15
Shannon, c.	Ariz	3,000,000	300,000	10	450.000	July 1907	.50
Snowstorm, s. l.	Ida	1,500,000	1,500,000	1	450,000	Sept. 1907	.03
Standard Con., g.s.	Cal	2,000,000	178,600	10	5,192,641	Dec. 1906	.10
Stratton'sIndepend	Colo	5,500,000	1,000,007	5	4,895,866	Apr. 1906	.12½
Swansea, g. s. l.	Utah	500,000	100,000	5	329,500	Mar. 1907	.05
Tamarack, c.	Mich	1,500,000	60,000	25	9,420,000	July 1907	4.00
Tennessee, c.	Tenn	5,000,000	175,000	25	1,662,500	Feb. 1908	1.25
Tomboy, g. s.	Colo	1,750,000	300,000	5	900 000	June 1906	.48
Tonopah of Nev.	Nevada	1,000,000	1,000,000	1	3,500,000	Oct. 1907	.25
Tonopah Belmont.	Nevada	2,000,000	1,295,007	1	518,003	Apr. 1907	.10
Tonopah Ext'nsion	Nevada	1,000,000	928,433	1	278,830	Apr. 1906	.15
Tonopah Midway.	Nevada	1,000,000	1,000,000	1	300,000	Jan. 1907	.05
Uncle Sam, g.s.l.	Utah	500,000	500,000	1	165 000	Oct. 1907	.03
United States, com.	Utah	37,500,000	467,430	50	1,147,653	Jan. 1908	.50
United States, pfd.*	Utah	37,500,000	348,167	50	4,242,146	Jan. 1908	.87½
United Cop. com.	Mont	75,000,000	450,000	100	5,962,500	Aug. 1907	1.75
United, c. pf.	Mont	5,000,000	50.000	100	1,500,000	May 1907	3.00
United, z. l., pf.	Mo.-Kan.	500,000	19,556	25	303,006	Oct. 1907	.50
United, (Crip'le C'k)	Colo	5,000,000	4,009,100	1	280,071	Apr. 1905	.00½
United Verde, c.	Ariz	3,000,000	300,000	10	19,710.322	Jan. 1908	.75
U.S. Red. & Ref. Pf	Colo	4,000,000	39,458	100	1,005,504	Oct. 1907	1.50
Utah, g.(Fish Sp'gs)	Utah	1,000,000	100,000	10	282,000	Oct. 1907	.03
Utah Con., c.	Utah	1,500,000	300,000	5	7,686,000	Jan. 1908	.50
Victoria, Utah	Utah	250,000	250,000	1	177,500	Mar. 1907	.04
Vindicator Con., g.	Colo	1,500,000	1,500,000	1	1,770,000	Jan. 1908	.04
Wolverine, c.	Mich	1,500,000	60,000	25	4,500,000	Oct. 1907	7.50
Work, g.	Colo	1,500,000	1,500,000	1	150,000	Oct. 1907	.01
YankeeCon	Utah	500,000	500,000	1	157,500	Oct. 1907	.03
Yellow Aster, g.	Cal	1,000,000	100,000	10	958,789	Aug. 1907	.20

*Previous to consolidation $1,436,250 were divided. †Amalgamated.

Coal, Iron and Other Industrials—United States.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf.	Ala	$2,500,000	24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf.	U. S.	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Amer. Ag. Chem., pf.	U. S.	20,000,000	181,530	100	7,920,460	Oct. 1907	3.00
American Cement	Pa.	2,000,000	200,000	10	1,168,000	Jan. 1908	.30
American Coal	Md	1,500,000	50,000	25	2,367,500	Sept. 1907	1.25
Associated Oil	Cal	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bethlehem Steel, pf.	Pa.	15,000,000	150,000	100	900,000	Nov. 1906	.75
Cambria Steel	Pa.	50,000,000	900,000	50	9,337,500	Feb. 1908	.75
Caribou Oil	Cal	100,000	80,000	1	56,000	July 1905	.07
Central C. & C., com.	Mo	5,125,000	51,250	100	2,152,500	Jan. 1908	1.50
Central C. & C., pf.	Mo	1,875,000	18,750	100	1,335,940	Jan. 1908	1.35
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.36
Claremont Oil	Cal	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock. C. & I.,pf.	Ohio	7,000,000	69,244	100	279,952	Oct. 1907	1.50
Consolidated Coal	Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidation Coal	Md.	10,250,000	102,500	100	9,621,650	Jan. 1908	3.50
Crucible Steel, pf.	Pa.	25,000,000	250,000	100	2,125,000	June 1907	1.50
Empire S. & I., pf.	N. J.	5,000,000	25,000	100	787,500	Jan. 1908	3.00
Fairmont Coal,	W. Va.	12,000,000	120,000	100	2,100,000	Jan. 1908	2.00
Four Oil	Cal.	500,000	300,000	1	105 400	July 1905	.01
General Chem. com.	U. S.	12,500,000	74,103	100	1,893,331	Sept. 1907	2.00
General Chem., pf.	U. S.	12,500,000	100,000	100	4,990,178	Jan. 1908	1.50
George's C'k Coal	Md	2,500,000	22,000	100	1,188,000	July 1904	3.00
Imperial Oil	Cal.	1,000,000	100,000	100	880,000	July 1905	.20
International Salt.		30,000,000	182,280	100	927,060	Dec. 1906	1.00
Jeff. & Cl'f C. & I , cm	Pa.	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I.,pf	Pa.	1,500,000	15,000	100	938,000	Feb. 1908	2.50
Kern River Oil	Cal.	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav.	Pa.	17,378,500	346,901	50	26,308,495	Nov. 1907	2.00
Maryland Coal,pf.	Md.	2,000,000	18,850	100	1,667,960	Jan. 1908	4.00
Monon R. Coal, pf.	Pa.	10,000,000	100,000	100	3,854,945	Jan. 1908	3.50
National Carbon, pf.	U. S.	4,500,000	45,000	100	2,047,500	May 1908	1.75
National Lead, com.	N. Y.	15,000,000	149,054	100	2,347,602	Jan. 1908	1.25
National Lead, pf.	N. Y.	15,000,000	149,040	100	16,845,968	Dec. 1907	1.75
Nat'l Steel & Wire,pf.	N. Y.	5,000,000	25,778	100	631,561	May 1906	1.75
New Central Coal	Md.	1,000,000	50,000	20	350,000	May 1907	.40
New River Coal, pfd.	W. Va.	4,000,000	37,617	100	225,702	Nov. 1907	1.50
Pacific Coast Borax	Cal.	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil	al.	1,000,000	92,000	10	396,320	May 1905	.14
Penna. Salt	Pa.	3,000,000	60,000	50	14,738,000	Oct. 1907	3.50
Penna. Steel, pfd.	Pa.	25,000,000	168,214	100	8,204,493	Nov. 1907	3.50
Phila. Gas, com	Pa.	28,953,029	579,061	50	8,484,336	Nov. 1907	.75
Phila. Gas, pf.	Pa.	6,000,000	120,000	50	2,550,000	Sept. 1907	1.25
Pittsburg Coal, pf.	Pa.	32,000,000	297,010	100	11,434,962	Apr. 1908	1.75
Pocahontas Coll., pf.†	W. Va.	2 800,000	28,000	100	84.000	Jan. 1908	3.00
Pocahontas Coll.,cm†		4,520,000	45,200	100	135,600	Oct. 1907	3.00
Republic I. & S., pfd.	Ill.	25,000.000	204,169	100	5,688,042	Dec. 1907	1.75
Sloss-Sheffield, com.	Ala	10,000,000	100,000	100	1,500,000	Dec. 1907	1.25
Sloss-Sheffield, pf.	Ala	10,000,000	67,000	100	3,400,250	Jan. 1908	1.75
Standard Oil	U. S.	100,000,000	970,000	100	590,722,905	Nov. 1907	10.00
Tenn. C. & I., com	Tenn	22,553,600	225,536	100	3,583,060	Nov. 1907	2.00
Tenn. C. & I., pf.	Tenn	248,000	2,480	100	390,040	Nov. 1907	1.50
Texas & Pacific Coal.	Texas	2,000,000	20,000	100	1,990,000	Dec. 1907	7.50
United Metals Selling		5,000,000	50,000	100	4,875,000	Jan. 1908	.50
U. S. SteelCorp.,cm.,		550,000,000	5,083,025	100	68.583.053	Dec. 1907	1.75
U. S. Steel Corp., pf.	U. S.	360.281,100	3,603,141	100	193.760,221	Nov. 1907	2.00
Va. Carolina Ch., pf.	U. S.	20,000,000	180,000	100	12,900,869	Jan. 1908	.50
Warwick I. & S.	U. S.	1,500,000	145,581	1	473,138	Nov. 1907	2.50
Westmoreland Coal.	Pa.	3,000,000	60,000	50	8,580,000	Oct. 1905	

Canada, Mexico, Central and South America.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex	$480,000	9,600	50	$258,064	Jan. 1905	$1.71
Batopilas	Mex	9,000,000	446,268	20	† 55,784	Dec. 1907	.12½
Buffalo, s	Ont	1,000,000	900,000	1.0	162,000	Jan. 1908	.08
Butters' Salvador, g.	Salv	750,000	150,000	5	600,000	Apr. 1905	.25
Coniagas (Cobalt)	Ont.	1,000 000	1,000,000	1	20.000	July 1907	.02
Consolidated M & S.	B. C.	5,500,000	53,552	100	781,885	Nov. 1907	1.25
Copiapo, c.	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.50
Crow's Nest Pass	B. C.	3,500,000	140,000	25	2,018,648	July 1907	.62½
Dominion Coal, com.	N. S.	15,000,000	150,000	100	2,550,000	Jan. 1908	1.00
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	£630,000	Feb. 1908	3.50
Dos Estrellas, g. s.	Mex	150,000	3,000	50	1,020,585	July 1906	13.65
El Oro, g. s.	Mex	5,750,000	1,080,000	5	4,600,800	Jan. 1908	.36
Esperanza, s. g.	Mex	2,275,000	455,000	5	7,233,520	Jan. 1908	1.12½
Foster Cobalt, s.	Ont.	1,000,000	1,000,000	1	50,000	Jan. 1907	.06
Granby Con.	B. C.	15,000,000	135,000	100	2,968,630	Sept. 1907	3.00
Greene Con. Copper.	Mex	8,640,000	864,000	10	6,137,800	Mar. 1907	.40
Greene Con. Gold.	Mex	5,000,000	500,000	10	300,000	July 1905	.20
GreenGold-Silv'r,pfd	Mex	3,000,000	300,000	10	120,000	Mar. 1907	.40
Guanajuato	Mex	3,000,000	540,000	5	74,250	Oct. 1906	.07
Guggenheim Expl.	Mex	17,000,000	105,000	100	3,960,000	Jan. 1908	2.50
Kerr Lake, s.	Ont.	3,000,000	600,000	5	480,000	Jan. 1908	.15
LeRoi No. 2, g.	B. C.	3,000,000	120,000	25	716,400	Feb. 1907	.24
McKinley-Darragh,s.	Ont.	2,500,000	2,000,000	1	180,000	Jan. 1908	.04
Mexican Coal & Coke	Mex	5,000,000	50,000	100	600,000	Dec. 1905	3.00
Mex. Con. M. & S. Co.	Mex	2,500,000	240,000	10	600,000	Aug. 1907	.60
Mines Co. of Am.	Mex	2,000,000	2,000,000	1	2,905,000	Dec. 1907	.08
N. Y. & Hond. Ros.	C. A.	1,500,000	150,000	10	2,367,000	Dec. 1907	.10
Nipissing, s.	Ont	6,000,000	1,200,000	5	1,500,000	Jan. 1908	.15
North Star	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	49,876	100	1,013,042	Oct. 1907	1.50
N. S. St. & Coal, pf.	N. S.	1,080,000	10,300	100	417,150	Oct. 1907	2.00
Penoles*	Mex	250,000	2,500	100	8,263,375	Aug. 1907	20.00
Pinos Altos	Mex	500,000	206,989	1	5,580	Sept. 1906	.00
Pistantillo	Mex	1,000,000	958,000	1	327,082	Apr. 1906	.03
Reco, g. s. l	B. C.	1,500,000	1,500,000	1	120,000	Jan. 1907	.08
Silver Queen, s.	Ont.	500,000	500,000	1	575,000	Dec. 1904	.08
Slocan Star	B. C.	3,500,000	3,202,000	1	402,120	Oct. 1905	.02
St. Eugene Con.	B. C.	1,000,000	10,600	100		Oct. 1907	2.00
Tezuitlan Copper	Mex	1,000,000	89,000	2	21,360	Jan. 1906	.48
Tilt Cove, c.	N. F.	1,000,000	89,000	1	80,000	Mar. 1907	.04
Trethewey, s.	Ont.	1,000,000	1,000,000	1	136,800	Dec. 1904	.36
Tyee, c.	B. C.	940,000	180,000	5			

*Mexican Currency. †Since reorganization. ‡Since August, 1905.

THE MINING INDEX.

The editors of this paper read all the important publications of the world that relate to mining and the treatment of minerals. This index is published as a reference for all interested and to make it impossible for readers of the ENGINEERING AND MINING JOURNAL to miss any important article published anywhere.

We will undertake to furnish a copy of any article (if in print) in the original language, for the price quoted. Where no price is quoted the cost is unknown. These papers are not kept in stock, but must be ordered from the publisher; hence there will be some delay for foreign papers.

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ANTIMONY

5222—USE AND TREATMENT of Antimony. F. T. Havard. (N. Z. Mines Rec., Oct. 16, 1907; 1½ pp.) The method of classifying antimony ores is explained and the different methods of smelting antimony ores are described. 40c.

ASPHALT

5223—BITUMINOUS SCHISTS—L'Industrie des Schistes bitumineaux. J. Magnin. (Journ. du Pétrole, Jan. 1, 1908; 3 pp.) The condition of this industry in France is treated in detail and the extent of the industry in Scotland is briefly described. 40c.

BARYTES

5224—NOVA SCOTIA—The Barytes Deposits of Lake Ainslie and North Cheticamp, N. S., with Notes on the Production, Manufacture and Uses of Barytes in Canada. H. S. Poole. (Geol. Surv. of Canada, 1907; 42 pp.) The general occurrence of barytes throughout Canada is outlined and the barytes deposits of the above districts in Nova Scotia are described in detail.

CEMENT

5225—PORTLAND CEMENT in Rocky Mountain Region. G. J. Bancroft. (Min. Science, Dec. 26, 1907 and Jan. 2, 1908; 4½ pp.) Briefly discusses the price and strength of portland cement manufactured in this region, stating the distribution of the principal deposits. The second instalment describes the plants of the Colorado Portland Cement Company, the U. S. Portland Cement Company and the Union Cement Company. 40c.

COAL AND COKE

5226—ANALYSIS—The Ultimate Analysis of Coal. G. A. Burrell. (West. Chem. and Met., Dec., 1907; 9 pp.) The manner of sampling coal is described; the methods of making tests for moisture and volatile matter are discussed. The article then treats in detail the combustion method of determining the fixed-carbon contents of coals. 60c.

5227—BRITISH COAL TRADE in 1907. (Coll. Guardian, Jan. 3 and 10, 1908; 17 pp.) Reviews very fully the conditions of the coal industry in the different shires of England with editorial comment on the same. 60c.

5228—BRITISH COAL TRADE—The Coal and Coke Trades of the United Kingdom in 1907. (Iron and Coal Tr. Rev., Jan. 3, 1908; 4½ pp.) A general review of the coal and coke industries is given and then the conditions that prevailed in the different districts are reviewed in detail. 40c.

5229—CANADA—Report on the Cascade Coal Basin, Alberta. D. B. Dowling. (Geol. Surv. of Canada, 1907; 37 pp., accompanied by 8 maps.) Outlines the general geology of the region and describes the coal seams at the different mines.

5230—CLARIFYING MINE DRAINAGE—Im Saarrevier übliche Kläreinrichtungen beim Spülversatzverfahren und die dadurch entstehenden Betriebskosten. Bodifée. (Glückauf, Dec. 28, 1907; 2 pp.) Describes a method for clarifying the water used for conveying culm into old workings, before pumping it to surface. 40c.

5231—COAL HANDLING APPARATUS of a Large Coke-Oven Plant. (Eng. Rec., Dec. 28, 1907; 2½ pp.) Describes the method of handling coal and coke at the plant of the By-Products Coke Corporation at Solvay, Ill. 20c.

5232—COAL MINING in the United States in 1907. (Eng. and Min. Journ., Jan. 4, 1907; 10½ pp.) Reviews of the general mining conditions in many of the important centers of anthracite and bituminous production. Discusses production, prices, legislation affecting the coal industry, new operations, car shortage, labor and other important subjects. 20c.

5233—COKE—The Marmac Coke Drawing and Loading Machine. (Iron Age, Dec. 26, 1907; 3½ pp.) A detailed description of the most important features of construction and operation, illustrated with drawings and photographs. 20c.

5234—FEDERAL COAL LANDS, Leasing the. H. Foster Bain. (Min. and Sci. Press, Jan. 11, 1908; 1 p.) Discusses the reasons for the advisability of the suggested change in the matter of the Federal coal land. 20c.

5235—FIRE DAMP—An Apparatus for Indicating Fire Damp in Coal Mines. (Sci. American, Jan. 11, 1908; 1½ pp.) Describes and illustrates the apparatus invented by H. G. Carleton. 20c.

5236—HEAT OF COMBUSTION—Parr's Method for the Determination of the Heat of Combustion of Coal. S. W. Parr. (Chem. Engr., Dec., 1907; 12 pp.) The method of determining the heat of combustion by means of the Parr calorimeter is discussed very fully. 40c.

5237—KENTUCKY—The Middlesboro Coal Field, Kentucky. John Howard. (Eng. and Min. Journ., Jan. 18, 1908; 3½ pp.) Describes the coal occurrence and the special problems of this coalfield. 20c.

5238—MONONGAH. P. U. Kellogg. (Charities, Jan. 4, 1907; 18 pp.) Describes the explosion and rescue work and then discusses the effect that the explosion has had on the community. 40c.

5239—MONONGAH MINE DISASTER. H. H. Stoek. (Mines and Minerals, Jan., 1908; 6½ pp.) This article describes the methods used at this mine in exploiting the coal and the conditions before and after the explosion. Also discusses the possible causes of the explosion. 20c.

5240—NEW MEXICO—Report of the Mine Inspector for the Territory of New Mexico to the Secretary of the Interior for the Fiscal Year Ended June 30, 1907. (Washington, D. C., 1907; Government Printing Office; 48 pp.) This report describes the coal mines of the Territory and gives statistics regarding the coal industry.

5241—PENNSYLVANIA—The Anthracite Mines at Alden, Penn. M. S. Hachita. (Eng. and Min. Journ., Dec. 28, 1907; 3½ pp.) Describes methods used. Method and cost of handling coal thoroughly discussed. Gives account of a serious mine fire and method used in fighting it. Illustrations and diagram of preparation of coal at the Alden plant. 20c.

5242—PULVERIZED COAL and Its Industrial Applications. W. D. Ennis. (Eng. Mag., Jan., 1908; 12 pp.) Continuation of article previously mentioned in this Index. Describes methods of feeding pulverized coal to the furnace and also the furnaces best adapted to burning such fuel. Gives details of cost of installation and operation. 40c.

5243—SAMPLING—The Importance of Uniform and Systematic Coal Mine Sampling. J. S. Burrows. (U. S. Geol. Surv., Bull. No. 316, 1907; 31½ pp.) Besides discussing the general subject of sampling coal, it gives the results of the analyses of the different coals, tested by the Government in the testing plant at St. Louis, and describes a series of experiments made on the sampling of coal.

5244—WAGE SCALE—Ueber Lohntarife im britischen und rheinisch-westfälischen Steinkohlenbergbau. Hilgenstock. (Glückauf, Dec. 21 and 28, 1907; 20 pp.) A comprehensive article showing how the difference in rates of wages at British and German coal mines is explained by the difference in occurrence of the coal seams. 60c.

5245—COAL STORAGE—Weathering of Coal. S. W. Parr and N. D. Hamilton. (Econ. Geology, Oct.-Nov., 1907; 9 pp.) In this article are given numerous diagrams representing graphically the effect on coal of different methods of storage. The conditions of storage were: (*a*) Outdoor storage; (*b*) exposure to dry atmosphere at somewhat elevated temperatures; (*c*) under the same conditions as *b*, but drenched with water two or three times a week; (*d*) submerged in water. 60c.

5246—WYOMING—The Coal Mines of Southern Wyoming. F. W. Parsons. (Eng. and Min. Journ., Jan. 11, 1908; 2 pp.) After outlining the general distribution of coal in the State, describes the Kemmerer mines and their general mode of operation. 20c.

5247—WYOMING—The Diamondville Coal Field, Wyoming. A. T. Shurick. (Eng. and Min. Journ., Jan. 11, 1908; 2 pp.) Describes the methods of mining used, the manner of ventilating the mines, as well as the geology and general occurrence of the coal in this field. 20c.

COPPER

5248—ALASKA—The Copper River District, Alaska. W. M. Brewer. (Min. and Sci. Press, Jan. 11, 1908; 2 pp.) First instalment outlines the railroad projects in southwestern Alaska and discusses the present situation in the fight for the right of way into this district. 20c.

5249—COMMERCIAL SITUATION—The Actual Situation of Copper. James Douglas. (Min. and Sci. Press, Jan. 4, 1908; 1 p.) The recent condition of the copper industry is reviewed and the present state of the industry outlined, especially the position in which the mining and smelting companies at present find themselves. 20c.

5250—CONCENTRATOR—The Six-Thousand Ton Concentrator of the Utah Copper Company. R. L. Herrick. (Mines and Minerals, Jan., 1908; 4½ pp.) Describes the construction and arrangement of the Utah Copper Company's new mill and outlines the method of milling. 20c.

5251—CONVERTER HOODS—Movable Converter Hoods. A. H. Wethey. (Eng. and Min. Journ. Jan. 11, 1908; 1½ pp.) The construction of these converter hoods, used at the Butte Reduction Works, is described in detail. 20c.

5252—ELECTRO-DEPOSITION of Copper. A. H. Sexton. (Mechan. Engr., Jan. 4, 1908; 3½ pp.) The electrolytic refining and electric smelting of copper ores are discussed. 20c.

5253—LONDON COPPER MARKET in 1907. (Eng. and Min. Journ., Jan. 18, 1908; 2 pp.) Reviews in detail the conditions in this copper market. 20c.

5254—METALLURGY—Notes on Copper—XII. A. H. Sexton. (Mechan. Engr., Dec. 7, 1907; 3½ pp.) Continuation of these notes on processes of extracting copper, the present article dealing with various processes of leaching copper from ores, both from raw ore or roasted cinder.

5254a—METALLURGY of Copper in 1907. W. R. Ingalls. (Eng. and Min. Journ., Jan. 4, 1908; 1 p.) A review of developments during 1907. 20c.

5255—MONTANA—Methods of Mining and Handling Ore in Butte. Edwin Higgins. (Eng. and Min. Journ., Jan. 11, 1908; 2½ pp.) Describes the general underground operations in the camp. 20c.

5256—PERU—The Cerro de Pasco Mining District, Peru. C. C. Sample. (Eng. and Min. Journ., Jan. 18, 1908; 3½ pp.) The different routes and the cost of the journey from New York to Cerro de Pasco are given; the effects of the great altitude are discussed and the topography and general climatic conditions described. 20c.

5257—POWER PLANT—Gas-Electric Power at the Mansfeld Copper Mines and Smelting Works. H. R. Speyer. (Electrochem. and Met. Ind., Jan., 1908; 3 pp.) The manner of utilizing the gases from the copper blast furnaces is described. 40c.

5258—PRECIPITATION FROM CUPRIFEROUS WATERS. F. H. Probert. (Min. and Sci. Press, Jan. 4, 1908; 3 pp.) Describes the method of precipitating copper used at Rio Tinto and Tharsis in Spain and compares the practice there with that at Butte, Montana.

5259—PRODUCTION—The Copper Production of North America. (Eng. and Min. Journ., Jan. 4, 1907; 5 pp.) Gives production of copper in the United States, Mexico and Canada. Contains interesting discussion on the copper market for 1907 and the situation in several of the most important producing districts. 20c.

5260—QUEENSLAND—Cloncurry Copper Mining District. L. C. Ball. (Queens. Gov. Min. Journ., Nov. 15, 1907; 10 pp.) Continuation of lengthy geological report which has previously been mentioned in this Index. 60c.

5261—SMELTER of the Mammoth Copper Mining Company at Kennett, California. D. F. Campbell. (Min. and Sci. Press, Jan. 4, 1908; 2½ pp.) The ore occurrence at the Mammoth mine is briefly described and then the equipment of the smelter and the method of smelting is given. 20c.

5262—SMELTER—The Tyee Smelter. R. L. Phelps. (Min. and Sci. Press, Dec. 21, 1907; 2 pp.) The equipment at this smelter is described in a general manner and the treatment of the ore outlined. 20c.

5263—SMELTING WORKS—Engineering Features of the Southwest Smelting and Refining Works, Jarilla Junction, N. Mex. (Eng. Rec., Jan. 4, 1908; 3½ pp.) This copper smelter is described in detail. 20c.

5264—SOUTH AUSTRALIA—The Production of Copper in South Australia. J. Plummer. (Min. World, Jan. 4, 1908; 1 p.) After briefly outlining the history of copper mining in South Australia, short descriptions are given of the ore occurrence at the Wallaroo, the Moonta and the Blinman mines, together with a few statistics regarding the present production of these mines. 20c.

5264a—VERMONT—Copper Mining in Vermont. G. A. Packard. (Eng. and Min. Journ., Jan. 4, 1908; 1 p.) Describes present conditions at the mines of South Strafford, Corinth and Eureka. 20c.

DIAMONDS

5265—DIAMOND-BEARING ROCK—Ueber das Vorkommen von Kimberlit in Gängen und Vulkan-Embryonen. F. W. Voit. (Zeit. f. prak. Geol., Nov., 1907; 4 pp.) Describes the composition and structure of the diamondiferous rocks of South Africa, and the occurrence of diamonds in them, and discusses the probable origin of the several deposits. 40c.

5266—MINING—Diamond Mining in South Africa. W. Taylor. (Mines and Minerals, Jan., 1908; 2 pp.) Treats entirely of South Africa; describes the occurrence in volcanic pipes and the methods of mining used at several of the diamond mines. 20c.

GOLD AND SILVER

5267—CALIFORNIA—Mining and Milling Practices at Queen Esther Mine, Cal. J. L. Martel. (Min. Science, Dec. 19, 1907; 1½ pp.) Describes the method of mining and milling at this mine in the Mojave desert. Also briefly describes a new excavator invented by G. W. Nicholson, which is used to remove the tailings from the cyanide vats. 20c.

5268—COLORADO—The Breckenridge Gold Placers, Colorado. A. Lakes. (Min. World, Jan. 4, 1908; 1 p.) The geology of the district is outlined and some of the placer deposits described. 20c.

5269—COLORADO—The Cripple Creek District of Today. H. T. Van Wagenen. (Mines and Mining, Jan. 10, 1908; 4½ pp.) The general conditions in the district are outlined and the method of mining and sorting the ore described. 20c.

5270—CYANIDATION of Ore Containing Both Coarse and Fine Gold. (Min. and Sci. Press, Dec. 14, 1907; ½ p.) C. W. Van Law describes the method he used with a similar ore at the Smuggler-Union mine, Telluride, Colo. E. H. Nutter also contributes to the discussion of the problem. 20c.

5271—CYANIDATION of Ore Containing Both Coarse and Fine Gold. E. M. Hamilton. (Min. and Sci. Press, Dec. 21, 1907; 1 p.) The advisability of plate amalgamation with or without subsequent cyanidation and of complete fine-grinding and cyanidation of such an ore is discussed. 20c.

5272—CYANIDATION—The B. and M. Circulating Tank. F. C. Brown. (N. Z. Mines Rec., Oct. 16, 1907; 5 pp.) The construction of the Brown agitator vat and the mode of operating it are described. The relative advantages of agitation by compressed air and by means of mechanical stirrers are discussed. 40c.

5273—CYANIDING TAILINGS—The Action of Alkaline Solutions in Cyaniding Weathered Pyritic Tailings. B. L. Gardiner. (Monthly Journ., Chamber of Mines of West Australia, Oct. 31, 1907; 4 pp.) The results of a series of experiments are given and discussed. 80c.

5273a—GOLD DREDGING in 1907. J. P. Hutchins. (Eng. and Min. Journ., Jan. 4, 1908; 1½ pp.) A review of progress made during 1907. 20c.

5274—GOLD MINES—The Great Gold Mines. T A. Rickard. (Min. and Sci. Press, Jan. 4, 1908; 3½ pp.) The statistics of the production of individual gold mines and districts are given and the relative greatness of different mines and districts discussed. To be continued. 20c.

5274a—GOLD-ORE TREATMENT, Progress in. Alfred James. (Eng. and Min. Journ., Jan. 4, 1908; 1½ pp.) A review of advances made during 1907, dealing with crushing, vacuum filters, Merrill's plant, Brown agitator, and cyanidation of silver-gold ores. 20c.

5275—HUNGARY—Nagybanya, Hungary. Edward Skewes. (Min. and Sci. Press, Jan. 11, 1908; 4½ pp.) The methods of mining and milling, used in this old mining district, are described and a brief outline of the history of the district is given. 20c.

5276—NEVADA—Some Bullfrog Mines. W. H. Spaulding. (Eng. and Min. Journ., Jan. 18, 1908; 1½ pp.) Much useful information about the mines and mills of the district is given. 20c.

5277—NEVADA—The Association of Alunite with Gold in the Goldfield District, Nevada. F. L. Ransome. (Econ. Geology, Oct.-Nov., 1907; 20½ pp.) Treats of the ore occurrence mainly from a mineralogical standpoint but the article also contains much general information about the orebodies at Goldfield. 60c.

5278—NEVADA—The Depth of Orebodies at Goldfield. (Min. and Sci. Press, Jan. 11, 1908; 1 p.) Discussion of this question by Walter L. Reid, E. P. Kennedy, E. A. H. Tays and Edwin C. Holden. 20c.

5279—NEVADA, the Silver State, and Government Irrigation in Nevada. The Truckee-Carson Project. O. C. S. Caster. (Journ. Franklin Inst., Jan., 1908; 26 pp.) The early history of mining in Nevada is reviewed and the irrigation projects are described. 60c.

5280—ONTARIO—The Larder Lake District. R. W. Brock. (16th Ann. Report, Ont. Bureau of Mines, Vol. XVI, Part 1, 1907; 16 pp. and 1 map.) Gives an account of a two weeks' investigation of this district.

5281—PRODUCTION—The Production and Commercial Movement of Gold and Silver. F. Hobart. (Eng. and Min. Journ., Jan. 4, 1907; 2½ pp.) Preliminary discussion on production of gold during last few years and its effect on the commercial world, followed by a review of the movement of gold and silver in the principal world markets. 20c.

5282—QUEENSLAND—Report on the Norton Goldfield. L. C. Ball. (Queensland Geol. Surv., Pub. No. 208, 1907; 47 pp.) This report reviews the history of the district; describes the geology of the region and gives details regarding the mines.

5283—QUEENSLAND—Some Croydon Gold Mines (Part 2). With Special Reference to Bennion's Reef and the Highland Mary Reef. B. Dunstan. (Queensland Geol. Surv., Pub. No. 212, 1907; 39 pp.) This report gives a general description of the Highland Mary reef and gives statistics of the gold produced by the different mines along it.

5284—QUEENSLAND—Some Goldfields of the Cape York Peninsula. W. E. Cameron. (Queensland Geol. Surv., Pub. No. 209; 21 pp.) Treats of the Starcke, the Alice River, the Hamilton, and the Coen goldfields and gives information regarding the important mines in each district.

5285—REFINING of Gold. Donald Clark. (Aust. Min. Standard, Nov. 27, 1907; 2 pp.) Treats of the chlorine method of refining together with the method of parting by means of nitric acid. 40c.

5286—SLIME TREATMENT at Kalgoorlie. M. W. Von Bernewitz. (Min. and Sci. Press, Dec. 14, 1907; 1 p.) Gives an outline of the process used at the Associated Northern mine, together with details of the time consumed in operating the filter-presses and costs. 20c.

5287—SLIMES TREATMENT—The Solis Compressed-air Slimes Agitator. G. G. Lyle. (West. Chem. and Met., Dec., 1907; 3 pp.) A brief description of the mine and mill of the Negociacion de los Reyes, Sinaloa, Mexico, is given together with a discussion of the milling method used. The Solis agitator, which uses the reaction produced by escaping compressed air, to cause rotation, is described in detail. 60c.

5288—TUBE MILL LINERS. S. D. McMiken. (N. Z. Mines Rec., Oct. 16, 1907; ½ p.) Describes the tube-mill liners used at the Komata mill, New Zealand, and gives some data regarding the lasting qualities of these liners. 40c.

5289—TUBE MILL LINING. C. E. Rhodes and the Blaisdell Company. (Min. and Sci. Press, Dec. 21, 1907; ½ p.) Correspondence dealing with priority of invention of the rib-liner, commonly known as the El Oro liner. 20c.

5290—TELLURIDE ORES—The Roasting of Telluride Ores. R. L. Mack and G. H. Scibibd. Introduction by T. T. Read. (Min. and Sci. Press, Dec. 14 and 21, 1907; 7½ pp.) Discusses the general metallurgy of telluride ores, treating very fully of the roasting of such ores. The second instalment gives records of a series of experiments made to determine the effect of temperature upon the volatilization loss and the dust loss while roasting. 40c.

GYPSUM

5291—OKLAHOMA—Extent and Importance of Oklahoma Gypsum Deposits. C. N. Gould. (Min. Science, Dec. 19, 1907; 2 pp.) The geology, mode of occurrence and quality of the gypsum deposits are described. The present and possible future development is discussed. 20c.

IRON AND STEEL

5292—BILLET MILL—A Modern Billet Mill Engine Equipment. (Iron Tr. Rev., Jan. 9, 1908; 1½ pp.) Describes 14-in. continuous bar and billet mill at the Duquesne steel works. 20c.

5293—BLAST FURNACE—New Blast Furnace of the Inland Steel Co. at Indiana Harbor, Ind. (Iron Tr. Rev., Jan. 16, 1908; 7½ pp.) The general equipment of this plant and especially the blast furnace itself are described. 20c.

5294—BLAST FURNACE—The New Blast Furnace of the Shenango Furnace Company at Sharpsville, Penn. (Iron Tr. Rev., Jan. 2, 1908; 7½ pp.) The construction of this new furnace is described in detail and the new points in its design are discussed. 20c.

5295—BLAST FURNACE PRACTICE—Recent Progress and Present Problems in the Blast Furnace Industry. J. J. Porter. (Iron Tr. Rev., Jan. 2, 1908; 7½ pp.) Lecture before the Cincinnati section of Am. Chem. Soc. The recent progress along metallurgical lines rather than respecting labor-saving devices is discussed very fully. 20c.

5296—BRITISH IRON AND STEEL TRADES in 1907. (Iron and Coal Tr. Rev., Jan. 3, 1908; 6 p.) The general conditions are first reviewed and then the different districts are treated in detail. 40c.

5297—DRY AIR BLAST—The Gayley Dry Air Blast at Warwick Furnace. (Iron Age, Jan. 2, 1908; ½ p.) Discusses the saving effected in operating expenses since the adoption of the dry-air blast. 20c.

5298—DUPLEX PROCESS for Steel Making. Henry M. Howe. (Electrochem. and Met. Ind., Jan., 1908; ½ p.) The advantages of this method of steel manufacture are discussed. 40c.

5299 — ELECTROMETALLURGY — The Electro-Thermic Production of Iron and Steel. J. W. Richards. (Journ. Franklin Inst., Jan., 1908; 11 pp.) Conclusion of article previously mentioned in this Index. Discusses the calculation of the heat balance of an

electric furnace, smelting Lake Superior iron ore, and also the calculations regarding the amount of electrical energy required to produce a ton of alloy and the current required to produce one ton of alloy per hour. 60c.

5300—HIGH SPEED TOOL STEEL, The Theory of. G. Auchy. (Iron Age, Dec. 26, 1907; 4 pp.) Compares the conclusions of the different authorities on this subject and gives the author's conclusions. 20c.

5301—IRON AND STEEL INDUSTRY in 1907. (Eng. and Min. Journ., Jan. 4, 1907; 8 pp.) A complete review of the iron and steel industry during 1907, in the United States and foreign countries. Contains many statistics of production, exports, imports, etc. 20c.

5302—LAKE SUPERIOR IRON MINES in 1907. D. E. Woodbridge. (Eng. and Min. Journ., Jan. 11, 1908; 3 pp.) Reviews the conditions on the different ranges. 20c.

5303—MELTING FURNACE—Fletcher's Iron Melting Furnace. (Mechan. Engr., Jan. 4, 1908; ½ p.) The construction and operation of this furnace is described. 20c.

5304—MELTING Iron in the Foundry Cupola. H. McCormack. (Electrochem. and Met. Ind., Jan., 1908; 1 p.) The results of a series of experiments made with a Whiting cupola are given and discussed. 40c.

5305—ONTARIO—Iron Ranges East of Lake Nipigon. A. P. Coleman and E. S. Moore. (16th Ann. Report, Ont. Bureau of Mines, Vol. XVI, Part 1, 1907; 43 pp.) The geology of the iron ranges is given together with an account of the work done upon the iron deposits.

5306—ROLLING MILL—The Grey Structural Mill at South Bethlehem. (Iron Age, Jan. 2, 1908; 6 pp.) Describes in detail the construction of this rolling mill and discusses the improvement made upon its German prototype. 20c.

5307—ROLLING MILLS—Novel Electric Drive for Rolling Mills. (Am. Machinist, Jan. 9, 1908; 3 pp.) Describes the electrical equipment of this, the only electrically driven universal mill in the United States. 20c.

5308—TESTING STEEL BARS—Cold-Rolled and Cold-Drawn Steel Bars. A. J. Wood. (Eng. News, Jan. 16, 1908; 1½ pp.) Records the results of a series of experiments made to determine the effect of cold rolling on the physical properties of steel bars and discusses these experiments. 20c.

5309—WASTE GASES—The Use of Blast Furnace and Coke-oven Gas. F. E. Junge. (Iron Tr. Rev., Jan. 2, 1908; 7 pp.) Treats mainly of the methods used to render these waste gases available for general power purposes, and gives statements regarding the cost of installing and operating such apparatus. 20c.

5310—METALLURGY of Lead. J. W. Richards. (Electrochem. and Met. Ind., Jan., 1908; 2 pp.) The metallurgy of lead is discussed and heat balances are given. 40c.

5311—METALLURGY of Lead in 1907. W. R. Ingalls. (Eng. and Min. Journ., Jan. 4, 1908; 2 pp.) A review of developments in the metallurgy of lead during 1907 in the United States. 20c.

5312—PRODUCTION of Lead and Spelter in 1907. (Eng. and Min. Journ., Jan. 4, 1907; 6 pp.) Contains statistics of production and price, notes on exports and imports; discusses market conditions and the situation in the different lead and zinc districts during 1907. 20c.

PETROLEUM AND NATURAL GAS

5313—CALIFORNIA—Geology and Oil Resources of the Santa Maria Oil District, Santa Barbara County, California. R. Arnold and R. Anderson. (U. S. Geol. Surv., Bul. No. 322, 1907; 161 pp.) This bulletin treats very fully of the development and the production of this oil district.

5314—FUEL OIL—Technical Aspects of Oil as Fuel—IV. F. E. Junge. (Power, Jan. 7, 1908; 4½ pp.) Further discussion of the Diesel oil engine and comparison with suction gas plant. Gives comparative fuel costs. 20c.

5315—OKLAHOMA—Extent and Importance of Oklahoma Oil Fields. C. N. Gould. (Min. Science, Jan. 16, 1908; 2 pp.) Describes the geology of the developed and undeveloped parts of this field and gives statistics regarding the output as well as discussing the future of the field. 20c.

5316—PETROLEUM INDUSTRY of the United States. H. C. George, E. Haworth and H. Foster Bain. (Eng. and Min. Journ., Jan. 4, 1907; 5 pp.) Gives production of the different fields and touches on factors affecting the industry during the year. Discusses new fields and operations in addition to reviews of the older districts. 20c.

5317—PROSPECTING—Zur Wahl der Bohrpunkte in den Erdölgebieten. H. Höfer. (Oest. Zeit. f. B. u. H., Dec. 14, 1907; 3 pp.) Discusses the proper situation of bore-holes when prospecting for oil in different forms of geological structure. 40c.

5318—REFINING of Californian Crude Oil. J. C. Christensen. (Petrol. Rev., Jan. 4, 1908; 2 pp.) Describes the method of refining in common use, especially the Starke process. To be concluded. 40c.

5319—STRUCTURAL OCCURRENCE—Relation of Anticlinal Structures to Gas, Oil and Water. A. Lakes. (Min. Science, Dec. 19, 1907; 1 p.) Discusses geological conditions in the Front Range region in Colorado, the Rio San Juan plateau in Utah and the Big Horn basin in Wyoming. 20c.

PHOSPHATE ROCK

5320—ARKANSAS—Developed Phosphate Deposits of Northern Arkansas. (Am. Fertilizer, Dec. 1907; 5½ pp.) Gives a brief outline of the history of the Arkansas deposits and discusses their distribution, geologic occurrence, and origin. 20c.

5321—TENNESSEE—Phosphate Mining in Tennessee. H. D. Ruhm. (Eng. and Min. Journ., Jan. 18, 1908; 1½ pp.) Reviews the conditions in this industry during the past year. 20c.

PRECIOUS STONES

5322—JADE—Die Jadeitlagerstätten in Upper Burma. A. W. G. Bleeck. (Zeit. f. prak. Geol., Nov., 1907; 26½ pp.) Outlines the geology of Upper Burma, discusses the occurrence of the jade, its physical, chemical and optical characters, and describes the methods used for mining it. 40c.

PYRITES

5323—ONTARIO—Iron Pyrites in Ontario. E. L. Fraleck. (16th Ann. Report, Ont. Bureau of Mines, Vol. XVI, Part 1, 1907; 52½ pp.) The mines are described very fully.

SAND

5324—SILICA SAND INDUSTRY. B. S. Randolph. (Eng. and Min. Journ., Dec. 28, 1907; 1½ pp.) Gives sources of supply and discusses the economic and geological features of the important fields. 20c.

SLATE

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MINING AND METALLURGICAL MACHINERY

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